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THE FAUNA OF BEETLES (COLEOPTERA) OF THE TURKESTAN REGION

Abdikassym A.A., Tolymbek G.M., Sailauova B.B., Zhalgasbek M.A.,
Ospanova G.S., Bozshatayeva G.T.
M. Auezov South Kazakhstan State University, Shymkent, e-mail: bozshataeva69@mail.ru

One of the objectives to research is to study the species composition and ecology of ground beetles inhabiting the nearby areas of the center of Turkestan region, the second – the study of xylophilic Coleoptera, which gives valuable information on the General state of ecosystems, patterns of development biocenosis of Turkestan region, the third – coccinellide, which are important regulators of the number of phytophages, including aphid –sucking pests and vectors of viral diseases of agricultural plants. As known, representatives of the family of ground beetles (Coleoptera, Carabidae) play an important role in natural and anthropogenic landscapes, methods of collecting beetles are simple, and the definition is not associated with the use of labor-intensive methods. This may explain the choice of beetles of the family Carabidae as a model as flight time and to monitor the status of biocenosis, biological method of combating pests of agriculture. Analysis of the literature data shows that possible indicator groups of insects in Kazakhstan is the account of species composition and number of beetles – black beetles, ground beetles, xylophilic beetles, etc. According to preliminary data, the species composition of beetles living on the territory of three districts of Turkestan region varies: the most diverse in terms of species Tulkubas district. Among the caught ground beetles predators are such species as Cicindelaturkestanica, Calosomasycophanta, Lebiacyanocephala, Lebiapunctata, Lebiacruxminor, Carabusgranulatus. Seven species of xylophilic beetles belonging to three families were registered in the study area.

Keywords: species composition, ground beetles, saproxylic beetles, coccinellides, abundance, frequency of occurrence

Now ladybugs are purposefully used in the biological method of pest control. One larva of a ladybug during its development destroys up to 500-700 aphids, and an adult beetle per day – 50-60 aphids.

The study of coccinellids of South-East Kazakhstan is devoted to the work of G. I. Savoy, which was composed of definitive tables for 133 species of larvae and 180 species of imago coccinellids. [1, 2]

Ground beetles – among Coleoptera belong to the largest and most diverse family. Currently, the number of species in this family is estimated in numbers from 20 to 40 thousand, which determines their importance as the most important components of communities that play a huge role in maintaining natural homeostasis.

Ground beetles are of great importance in environmental studies, they respond quickly to changes in microclimatic and soil-plant conditions, therefore they are often used as one of the convenient bioindicators for assessing the state of the environment. [3]

Large ground beetles of the genera Calosoma and Carabus eat shaggy caterpillars (for example, unpaired (Lymantriadispar L.) and Siberian (DendrolimussibiricusTschetw) silkworms, which in nature have almost no other natural enemies.

However, there are also herbivorous species in this family, some of which are primary pests of grain crops (for example, bread ground beetle or peun – Zabrustenebrioides).

The wide ecological plasticity of the family members is the reason for their widespread abundance. Ground beetles inhabit almost the entire range of latitudes from cold tundra to deserts.

Due to the large size and bright color, representatives of some groups of ground beetles are of aesthetic importance, are also a favorite collectible. [4]

In Kazakhstan, representatives of about 100 families of the order of Coleoptera, belonging to the 2 largest sub-orders: carnivores (Adephaga) and Polyphaga (Polyphaga).

Inhabit all habitats land, except the eternal snows of the highlands, and freshwater (the most numerous and noticeable predaceous diving beetles Dytiscidae, Hydrophilidae water scavenger beetles and whirligig beetles Gyrinidae).

Most numerous in terrestrial ecosystems, are ground beetles (Carabidae), Rove beetles (Staphylinidae),scarab (Scarabaeidae), chernotsky (Tenebrionidae) blister beetles (Meloidae), leaf beetles (Chrysomelidae), Longhorn beetles (Cerambycidae), weevils (Curculionidae).

Representatives of these families, meet the criteria of indicator species, can be widely used in assessing the state of various ecosystems. [5]

According to Ishkov E.V. et al (2001) in the Aksu-Dzhabagly nature reserve, located in Tulkubas district of the Turkestan region, there are about 700 species of beetles belonging to 300 genera and 41 family of the ground beetles – 113 species, the fauna of beetles of dendrophagus – 73 species, 25 species of ladybirds, 34 species of darkling beetles. The first place in the number of species is the family of weevils, or elephants. In these beetles the head is extended into a long tube, often exceeding

the length of the body. All weevils are herbivorous, larvae and adults feed on roots, stems, flowers, fruits, etc.

The ground beetles belonging to the group of carnivorous beetles are widespread in Aksu-Dzhabagly, although there are both predators and herbivorous species among them. Among the predatory interesting horse Turkestan – medium-sized beetle metal-green with red spots on the back. He very quickly runs round, well flies, prefers dry open spaces. The larva lives in burrows, where it lies in wait for prey, catching that, pierces the mandibles and sucks.

The largest beetles of this family belong to the genus of real ground beetles (Carabus). They are 7 species in the reserve, most of them are Western Tien Shan endemics and differ in the early spring period of activity.

Close to them are large, averaging 3 inches long, the most beautiful we have-odorous Krasotel and Callisthenes Kushakevicha. The first is painted in Golden-green, the second – in blue-purple with a metallic sheen.Krasotel in the reserve are scarce, found mostly in the reeds, and juniper bushes, very useful, because it destroys the larvae and pupae of lepidopteran pests.

Kallistenes Kushakevich – West Tien Shan endemic – most common in the foothills and low steppe. Beetles are most active in April – may, at this time 14-18 individuals can be counted on 1 kilometer of the route 1-2 meters wide.

Common in the reserve ground species of ground beetles – dull (8 species) and black runners (7 species), small bembidions (11 species). Species with an interesting biology, mention should be made of Libi – beautiful, metallic-green, blue (labiolingually and point) or black cross with red and yellow pattern (Libya-Crusader) beetles with a flattened body with small dimensions.

In Aksu-Dzhabagly they are found in the belts of steppes and juniper, often on trees and shrubs, usually under the bark of juniper, birch. Adult individuals feed on aphids and other insects, and their larvae parasitize on pupae of leaf beetles. [6]

In connection with all the above, we can conclude that the study of ground beetles and other Coleoptera is of great practical importance.

In connection with all the above, we can conclude that the study of ground beetles and other Coleoptera is of great practical importance.

Overall, in the Turkestan region the fauna of ground beetles and beetles of dendrofagous, coccinellides understudied, and data on ecology of these beetles are few.

Materials and research methods

The material served as gathering of authors, 2018, the Survey was conducted by the routing method. To collect the material used generally accepted methods in entomology: insect sampling with entomological net and hand picking. In connection with all the above, we can conclude that the study of ground beetles is of great practical importance.

Barber traps were also used to collect insects, in which a formaldehyde solution was used as a fixing fluid. [7, 8]

Results of the research and discussion

Turkestan region is located in the South of Kazakhstan, within the Eastern part of the Turan lowland and the Western spurs of the Tien Shan. Most of the territory is flat, with the hilly-ridge Sands Kyzyl Kum steppe Sochi (South-West, on the left Bank of the Syr Darya) and moyynqum (in the North, on the left Bank of Chu).

The Northern part is occupied by the Betpak-Dala desert, in the far South – the Hungry steppe. The middle part of the region is the Karatau ridge, in the South-East – the Western outskirts of Talas Alatau, Karzhantau and Ugam (the highest point – Sairam peak). The major rivers – the Syr Darya and its tributaries Keles Kurkeles, ARIS, Bugun etc.) crosses the region from South to Northwest, and the Chu river (downstream) flowing to the North and disappearing in the Sands of the Moyynqum.

The region is located in a zone of sharply continental climate. Fertile soil, plenty of sunlight, vast pastures create great opportunities for the development of various sectors of agriculture in the area, primarily irrigation farming and grazing sheep. High yields give crops of cotton, rice, as well as gardens and vineyards.

For the study of Coleoptera of the Turkestan region was selected three districts-Tyulkubas, which houses the Aksu-Dzhabagly reserve and the Sairam-Ugam national Park; Sairam – rasparenny near the city of Shymkent and Baidibek, typical gray soils with significant tracts of salt licks and salt marshes.

On the basis of collections, study of collection materials, as well as with the involvement of literary data, the preliminary data on beetles-ground beetles living in the territory of the Turkestan region (the table contains a preliminary list of ground beetles of certain regions of the region).

Preliminary composition of ground beetles and their occurrence in some regions of Turkestan region

Typeofgroundbeetles	Tulkubasdistrict	Sairamdistrict	Baidibekdistrict
CallistheneskuschakevitschiBallion	+	_	_
Calosomasycophanta	+	_	_
ScaritessalinusDejean	+	+	+
ScaritesterricolaBonelli	+	+	+
LebiacyanocephalaLinnaeus	+	+	+
Lebiapunctata	+	+	+
Lebiacruxminor	+	+	_
ChlaeniusextensusMannerheim	+	-	-
CicindelaturkestanicaBallion	+	-	-
Bembidionquadrimaculatum (Linnaeus, 1761)	+	+	+
CarteruscalydoniusRossi	+	_	_
Carabusgranulatus	+	+	+

Of the above ground beetles, Cicindelais a predatory species. Calosoma sycophanta turned out a very effective means of dealing with the Gypsy moth (most often the victims of the entomophage that unpaired and ringed caterpillar moth, American white butterfly, the oak leafroller).

Beetle Callistheneskus is Tien Shan endemic. Lebiacyanocephala, Lebiapunctata, Lebiacruxminor are regulators of the number of harmful insects, so adults feed on aphids, and their larvae parasitize on pupae of leaf beetles. Carabusgranulatus beetles and their larvae, like most ground beetles, benefit by destroying pests.

According to preliminary data, seven species of xylophilic beetles belonging to three families have been registered in the territory of Turkestan region:

1. FamilyScolytidaeLatreille, 1806 – Bark Beetles.

Family woodworm – Xyleborinus saxeseni (Ratzeburg, 1837). The polyphagous Gypsy bark beetle, damage the trees and shrubs. It occurs very often in different types of plantations of mixed and deciduous forests, which develops on different broad-leaved species. Damages poplars and willows.Lays rather deep moves, which develops black ambrosianae mushrooms.Attacks the fallen and standing weakened trees of different age.

The zabolonnikom wrinkled Scolytusrugulosus Ratzeburg, 1837 (Smediaterraneus Eggers, 1922). Lives on all fruit trees, hawthorn and forest plantations with the presence of fruit trees. Scolytusrugulosus is the most dangerous of the sapwood in wild and cultivated fruit plantations.

2. FamilyBuprestidae – Zlatki. The Genus Julodis.

Spotted zlatka – Julodisvariolarisvariolaris (Pallas, 1771). At the larval and imago stage, it can harm seedlings and young fruit trees. Beetles gnaw the bark of young branches, leaf stalks, can gnaw the buds of fruit trees, preferring stone. With mass reproduction, their damage can lead to defoliation of young trees. The economic importance of this species as a pest is greatest in the southern regions with arid climate.

Juniper zlatka – Anthaxia (Melanthaxia) conradti.Damages Juniperus (Juniperus). The larvae of jewel beetles gnaw under bark flat, sharp-edged, sinuous, gradually widening passages, maskoobraznoe wavy tightly clogged with wood dust. Years in April – may, often delayed until July. Female lays eggs in cracks and under bark scales on weakened trees and juniper felling remains. Larvae gnaw long, winding, gradually expanding and weakly touching the wood moves. They spend the winter, in spring they turn into pupae. Then through a decade of in – bugs. In gold beetles gnaw through the flight opening, which has the form of more or less elongated, sometimes very narrow ellipse. One side, corresponding to the back of the beetle, is flatter, the other – corresponding to its abdominal surface, more convex. Young beetles feed on the flowers of a dandelion, then hips.

3.TheCerambycidae Family Is Barbels.

Gray long-moustached beetle – Acanthocinus griseus (Fabricius, 1793) – beetle from the family of barbels prefers coniferous trees (pine Pinus, fir Abies, spruce Picea).

Development lasts 1-2 years. Adult beetles appear from April to August. Larvae live and develop in coniferous and deciduous wood. Usually the beetle inhabits wind or felled trees, but sometimes it can attack quite healthy ones.

When a large number of larvae of the Longhorn beetle eat all podkrovie space, hammering it compressed sawdust and thus preventing the settlement of other xylophagous.

Moustache violet (woodcutter violet flat) – Callidium violaceum (Linnaeus, 1758). It develops under the bark in the surface layers of dried coniferous wood. Adults are active in may – July. The female lays eggs in the cracks of the bark. Larvae lay long winding passages going into the thickness of the wood. Both larvae and beetles winter, leaving in depth of wood. Prefers coniferous and fruit trees.

Ragium ribbed – Rhagium inquisitor (Linnaeus, 1758). The larva develops under the bark of fallen trees of all conifers, occasionally and deciduous. Inhabits both dead and old trees and stumps of conifers. The trees usually takes the shadow side of the trunks. The large number found in the stacks of planks and slabs. Larvae gnaw bark, bast and wood, paving winding passages.

We also found five species of coccinellide/ Adoniavariegata (Goeze, 1777), Hippodamiaun decimnotata(L., 1758). – met in fairly wet areas of grass, Propylaea quatuordecimpunctata (L., 1758) –eurybiont, Coccinella septempunctata (L., 1758) – widespread eurybiont, Adalia bipunctata (L.,1758) – eurybiont.

Conclusion

According to preliminary date, the species composition of beetles living on the territory of three districts of Turkestan region varies: the most diverse in terms of species Tulkubas district.

Among the caught ground beetles predators are such species as Cicindela turkestanica, Calosoma sycophanta, Lebia cyanocephala, Lebia punctata, Lebia cruxminor, Carabus granulatus.

Xylophilic beetles are represented by 7 species belonging to 3 families:

– Scolytidae – family woody – Xyleborinus saxeseni, wrinkled sapwood – Scolytus rugulosus;

– Buprestidae – spotted zlatka – Julodis-variolaris, juniper zlatka – Anthaxia (Melanthaxia) conradti;

– Cerambycidae – Longhorn beetle gray long mustache and small – Acanthocinus griseus, moustache violet (cleaver violet flat) – Callidium violaceum, rage – ribbed Rhagium inquisitor.

Coccinellidae is represented by 5 species: Adonia variegate, Coccinella septempunctata prefer open, relatively dry habitats and are most numerous on the tops of river watersheds, agricultural lands and roadsides.

Propylaea quatuordecimpunctata – chortoantobiont. The most common and abundant species in the area.

Hippodamia (Semiadalia) undecimnotata – hygrophil, was found in fairly wet areas of grass along the rivers.

Coccinellid kind Adaliabipunctata L. – the inhabitants of the forest zone, agricultural areas, exterminate the aphids on tree species, the primary natural enemies of aphids with fruit crops.

Among the found species, the most numerous species of ladybugs in the territory of the Turkestan region was Adoniavariegate, Adaliabi punctata, Coccinella septempunctata and Propylea quathuordecimpunctata that, thus they play an important role in reducing the number of harmful insects and can therefore act as promising targets for the control of aphids.

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MATERIALS TO STUDY SPECIES COMPOSITION, LIFE FORMS AND FOOD SPECIALIZATION OF HEMIPTERA (HEMIPTERA) SYRDARYA-TURKESTAN REGIONAL NATURE PARK

Makhambet G.K., Kurbankul N.N., Bozshatayeva G.T., Ospanova G.S., Turabaeva G.K.
M. Auezov South Kazakhstan State University, Shymkent, e-mail: bozshataeva69@mail.ru

Targeted faunal studies of Heteroptera in the Turkestan region were initiated by Esenbekova P. A. and employees of the SRPP "Syrdarya-Turkestan", but the species composition, the economic value of bed bugs in southern Kazakhstan has not been studied enough, which causes the need for regional ecological and faunal studies, semi-Coleoptera, in particular the Turkestan region, is a unique region for ecological and entomological studies, as it is characterized by a wide variety of invertebrates. The development of cadastre and monitoring of entomocomplexes of specially protected natural areas – the regional natural Park Syrdarya-Turkestan-is relevant. The importance of studying the entomofauna of protected natural areas has been repeatedly emphasized in the national scientific press (Temreshev I.I, Kazenas V.L., Childebaev M.K., Isenova G.D., Kozhabaeva G. E., 2015, etc.). The preliminary studies conducted by the authors in the species composition of semi-Coleoptera, as well as in their life forms and food specialization showed the following results: as a result of research, 65 species of bedbugs belonging to 17 families were identified; the largest number of species are Pentatomidae (21.5%), Lygaeidae (13.8%), Miridae (12.3%), Rhopalidae and Coreidae (9.2% each). In such families as Naucoridae, Pleidae, Gerridae, Stenocephalidae revealed one species; life forms dominated by a group of chortobionts and the number of species and the number of presents in her collections; trophic groups of semi-Coleoptera are represented as follows: phytophages (in General, more than 76.9% of the known number of species), zoophages (18.4%), species with mixed type of nutrition (4.7%).

Keywords: Hemiptera, species composition, food specialty, vital form

The basis of the fauna of semi-winged Kazakhstan are terrestrial herbivorous species. They feed on the juices of plants, mainly their generative organs and seeds. Some of the ground bugs, as well as most of the water bugs and all the water meters are predators, they suck out various insects, their larvae and eggs, mites, etc.

Among the many plant-eating bugs pests of agriculture and forestry. Some herbivorous bugs are carriers of viral diseases of plants. Some bugs that live in the water are harmful to fisheries, sucking caviar and fish fry.

Many predatory bedbugs are useful because they destroy aphids, ticks, caterpillars, larvae of beetles harmful to agriculture and forestry, etc.

Bedbugs are common all over the world, there are about 30 thousand species, United in 50 families.

There are 35 families, more than 1200 species in Kazakhstan. Among the bedbugs there are many large and brightly colored species; most species have a close relationship with certain biotopes, many lead an open lifestyle and are sensitive to the state of the environment.

All this makes many bedbugs suitable for use as indicator species in monitoring and assessing the status of various aquatic and terrestrial ecosystems. There are especially many such species in the families Pentatomidae, Lygaeidae, Coreidae, Reduviidae and Scutelleridae. Since bed bugs can cause significant harm to agricultural plants, it is necessary to constantly monitor the status of populations of the most harmful species. [1]

The creation of the "Syrdarya – Turkestan regional natural Park" is associated with such an important task as the preservation of biodiversity of living organisms within it.

One of the stages in solving this problem is the inventory of flora and fauna of the natural Park, which will create a basis for monitoring studies.

For the SyrDarya – Turkestan regional natural Park consisting of three branches, a more detailed study of the entomofauna is relevant.

P.A. Essenbekova (Institute of Zoology of KN MES RK) and employees of "Syrdarya-Turkestan grpp" conducted a great work on the study of fauna of semi-winged (Heteroptera) "Syrdarya-Turkestan State Regional natural Park".

The authors obtained information on the biology and ecology of 25 species of bedbugs belonging to 8 families of the order of half-winged in the Arys region of South Kazakhstan region (now Turkestan region), among them species diversity stand out. Pentatomidae (7 species – 28%), Lygaeidae (5 species – 20%), Rhopalidae (4 species – 16%), Nabidae (3 species – 12%), in other families 1-2 species (4-8%) are known.

On the food relations among bugs are the predators, phytophagous bugs, and species with a mixed diet, it was Topalov – 4 types, soovitatav – 2 species, the other species belonged to the phytophagous. [2]

Herbivorous species feed on the juices of plants, mainly their generative organs and seeds. Predators suck out various insects, their larvae and eggs, ticks. The fauna of Hemiptera

of the mountain Boraldai was mainly terrestrial species – 29 (87,8%), from marked water – 4 species (12.2 percent).

The family Pentatomidae – 9 species (27.3%), Rhopalidae – 4 species (12.1%) were distinguished by species diversity, and the remaining families were represented by 1-3 species [3.4].Herbivorous species feed on the juices of plants, mainly their generative organs and seeds. Predators suck out various insects, their larvae and eggs, ticks. The fauna of Hemiptera of the mountain Boraldai was mainly terrestrial species – 29 (87,8%), from marked water – 4 species (12.2 percent).

The family Pentatomidae – 9 species (27.3%), Rhopalidae – 4 species (12.1%) were distinguished by species diversity, and the remaining families were represented by 1-3 species. [3,4]

Materials and research methods

The material served as gathering of authors, 2018, the Survey was conducted by the routing method. Collection and study of insects were carried out by conventional methods. [5, 6]

From grassy plants, bushes and branches of trees bedbugs gathered net; species living on the surface of the soil, at the roots of plants, in the forest litter, under the bark of trees and various shelters, caught with an exhauster or tweezers; water bugs collected water net.

Monographs by I.M. Kerzhner (1981), P.A. Esenbekova (2013) were used to determine the species composition of the semi-Coleoptera.

The types of stenobiont, eligibilty and eurybiont depending on the latitude of adaptation to specific environmental conditions; phytophagous, zoophagy and soovitage the nature of the trophic relations; monophagy, oligophagy and polyphages on features of food specialization (Kulik, 1973; Asanova, Iskakov, 1977, Kerzhner, 1981; Stop, 1990; Balakhonov, 1998; Dugaev, 2000; these intellectual, 2013). [7,8,9]

Results of the research and discussion

In 2018, the study of semi-winged "Syrdarya – Turkestan regional natural Park" was continued by the authors, the results of partial processing fees included in the preliminary list of species, but most of the materials are in the process of processing.

The table presents the preliminary taxonomic composition of the families of semi-winged GRPP "Syrdarya-Turkestan", their life forms and food specialization, which is based on the analysis of these literary sources, the study of the collection of the scientific Department of GRPP and the primary processing of the authors ' fees.

Below is a description of the main representatives of the most numerous families of semi-winged GRPP "Syrdaria-Turkestan".

Family Pentatomidae –real shchitnik. A representative of the Carpocoris fuscispinus family (Boheman, 1851) is found in grassy meadows. Politicial herbaceous plants (Verbascum, Achillea, Artemisia, Senecio, Carduus, Cirsium, Centaurea, Jurinea, Crepis, Salvia, Lepidium, Rumex, Malva, Poa, Festuca, Nuosavi on other herbaceous plants.

The family Miridae – horseflies. Representatives of the family: Stenodema calcarata (Fallen, 1807). The species is mesophilous. Occurs on floodplain meadows, on cereals and sedge plants; potential pest of cereals; adults and Adelphocoris lineolatus (Goeze, 1778) overwinter – on meadow complex-colored, marsh and leguminous plants. Politicial with a large preference for legumes.

The lygaeidae family are landers. The representatives of semesta – Bianchiella sarmatica Kiritshenko, 1926. Xerophile. Inhabits semi-desert, sandy steppe, on the Sands, among turfs Stipa capilata); monovoltine species; overwinter as adults.

Nysius ericae ericae (Schilling, 1829). Xerophil, lives in dry places, well warmed by the sun with sparse vegetation, occurs on Compositae, Cruciferae, Rosaceae, Euphorbiaceae, Chenopodiaceae, and other herbaceous plants, feeding on seeds of plants, bivoltine; the adults overwinter.

Emblethis ciliatus Horvath, 1875. Meso-xerophile. Inhabits the steppe, semi-desert, floodplains, sandy steppe, on saline areas); gives 2-3 generations per year; wintering adults.

Family of hunters–Nabidae. Nabisferus (Linnaeus, 1758). Mesophilic species, confined mainly to the banks of rivers, lakes and springs. A predator feeding on flies, aphids, cicadas, bedbugs and other insects. It is the most useful species of semi-Coleoptera in agriculture.

The family Rhopalidae – maces. Representatives Rhopalus subrufus (Gmelin, 1790) the species is mesophilous. Found on mesophytous meadow vegetation in forest and steppe areas, meadows and forest edges, roadsides, margins of forests, slopes of ravines; politicial various herbaceous plants; bivoltine; the adults overwinter.

Corizus hyoscyamihyoscyami (Linnaeus, 1758). The species is mesophilous. Inhabits clearings, meadows and other open habitats with moderate moisture; the main food plants are: niger Hyoscyamus, Tabacum, Ononis spinosa, Erodium, is considered a pest of legumes; bivoltine; the adults overwinter. Widespread, mass species.

Preliminary taxonomic composition of the families of semi-rigid winged groups "Syrdaria-Turkestan", their life forms and food specialization

Family	species	vital form	Food specialization
Nabidae	Nabis ferus	chortobiont	zoofag
	Nabispunctatus	chortobiont	zoofag
	Nabispallidus	dendrobiont	zoofag
Anthocoridae	Orius horvathi	chortobiont	zoofag
	Xylocoris modestus	herpetobiont	zoofag
Reduviidae	Oncocephalusplumicornis	epigeobionts	zoofag
	Rhynocoris iracundus	dendrochortobiont	zoofag
Rhopalidae	Rhopalusparumpunctatus	chortobiont	polifitofag
	Stictopleurus punctatonervosus	chortobiont	wide oligofitofag
	Corizus hyoscyami	chortobiont	polifitofag
	Brachycarenus tigrinus	eurychortobiont	polifitofag
chortobiontMiri-dae	Stenodemacalcarata	chortobiont	polifitofag
	Orthotylus eleagni	dendrobiont	зоофитофаг
	Lyguspratensis	chortobiont	polifitofag
	Adelphocorislineolatus	chortobiont	polifitofag
	Nasocoriaephedrea	chortobiont	narrow oligofitofag
	Capsus cinctus	chortobiont	wide oligofitofag
	Trigonotylus caelestialium	chortobiont	wide oligofitofag
	Plagiognathus chrysantemi	chortobiont	polifitofag
Lygaeidae	Bianchiella sarmatica	herpetobiont	narrow oligofitofag
	Nysius ericae ericae	chortobiont	polifitofag
	Emblethis ciliatus	herpeto-chortobiont	polifitofag
	Lygaeus equestris	herpeto-chortobiont	polifitofag
	Spilostethuspandurus	herpetobiont	polifitofag
	Rhyparochromus vulgaris	herpeto-chortobiont	polifitofag
	Heterogaster affinis	chortobiont	wide oligofitofag
	Ischnocoris punctulatus	herpeto-chortobiont	narrow oligofitofag
	Heterogaster urticae	chortobiont	narrow oligofitofag
chortobiont Coreidae	Coriomeris scabrocornis	herpeto-chortobiont	wide oligofitofag
	Centrocoris volxemi	chortobiont	wide oligofitofag
	Coreusmarginatus	chortobiont	wide oligofitofag
	Syromastusrhombeus	chortobiont	polifitofag
	Enoplopsscapha	chortobiont	polifitofag
	Coreus marginatus marginatus	chortobiont	wide oligofitofag
Pentatomidae	Carpocoris fuscispinus	chortobiont	polifitofag
	Carpocorispurpureipennis	chortobiont	polifitofag
	Carpocoris pudicus	chortobiont	polifitofag
	Aelia acuminata	chortobiont	wide oligofitofag
	Brachynema germari	chortobiont	polifitofag
	Codophila varia	chortobiont	polifitofag
	Antheminia lunulata	chortobiont	polifitofag
	Eurydema ornate	chortobiont	wide oligofitofag
	Carpocoris pudicus	chortobiont	полифитофаг
	Graphosoma consimile	chortobiont	wide oligofitofag
	Codophila varia	chortobiont	полифитофаг
	Graphosoma lineatum	chortobiont	wide oligofitofag
	Dolycorisbaccarum	eurychortobiont	polifitofag
	Eurydema oleracea	chortobiont	oligofitofag
Scutelleridae	Eurygasterintergriceps	chortobiont	wide oligofitofag
	Odontotarsuspurpureolineatus	chortobiont	polifitofag

End table

Family	species	vital form	Food specialization
Rhopalidae	Corizus hyoscyami	chortobiont	polifitofag
	Brachycarenus tigrinus	eurychortobiont	polifitofag
	Chorosoma schillingii	chortobiont	wide oligofitofag
	Maccevethus corsicus persicus	chortobiont	polifitofag
	Rhopalus subrufus	chortobiont	polifitofag
	Stictopleurus crassicornis	chortobiont	polifitofag
Stenocephalidae	Dicranocephalusagilis	chortobiont	narrow oligofitofag
Notonectidae	Notonectaglauca	hidrobiont	zoofitofag
Pleidae	Plea minutissima	hidrobiont	zoofitofag
Naucoridae	Ilyocoriscimicoides	hidrobiont	zoofag
Nepidae	Nepa cinerea	hidrobiont	zoofag
	Ranatralinearis	hidrobiont	zoofag
Gerridae	Gerris odontogaster	hidrobiont	zoofag
Pyrrhocoridae	Pyrrhocoris apterus	herpetobiont	zoofitofag
	Gerris lacustris	hidrobiont	zoofag

Family Coreidae – Crevice. Representatives – Coriomeris scabrocornis scabrocornis (Panzer, 1805). Lives on the surface of the soil in open habitats; in meadows, steppes, soils of different types, tends to sandy and clay; found on legumes and herbaceous plants of other families; gives up to 2 generations per year; wintering adults and larvae.

Coreus marginatus (Linnaeus,1758). Plant-eating bug that lives on different plants. Adults are omnivorous, feed mainly on sorrel. Larvae on buckwheat. During the growing season gives one generation. It hibernates in the adult phase of the insect under plant litter.

Conclusion

The preliminary studies conducted by the authors in the species composition of semi-Coleoptera, as well as in their life forms and food specialization showed the following results:

– as a result of research, 65 species of bedbugs belonging to 17 families were identified;

– the largest number of species are Pentatomidae (21.5%), Lygaeidae (13.8%), Miridae (12.3%), Rhopalidae and Coreidae (9.2% each). In such families as Naucoridae, Pleidae, Gerridae, Stenocephalidae revealed one species;

– life forms dominated by a group of chortobionts and the number of species and the number of presents in her collections;

– trophic groups of semi-Coleoptera are represented as follows: phytophages (in General, more than 76.9% of the known number of species), zoophages (18.4%), species with mixed type of nutrition (4.7%).

The obtained data on the taxonomic composition, ecology of semi-winged studied GRPP "Syrdarya-Turkestan" confirm the importance of this specially protected area in the conservation of biodiversity of semi-winged southern Kazakhstan. – trophic groups of semi-Coleoptera are represented as follows: phytophages (in General, more than 76.9% of the known number of species), zoophages (18.4%), species with mixed type of nutrition (4.7%).

The obtained data on the taxonomic composition, ecology of semi-winged studied GRPP "Syrdarya-Turkestan" confirm the importance of this specially protected area in the conservation of biodiversity of semi-winged southern Kazakhstan.

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BIOLOGICAL POLLUTION OF NUTRITION PRODUCTS OF ANIMAL ORIGIN IN TURNOVER OF THE TOWN OF BISHKEK

Sharshenaliyeva G.A., Usengaziyeva G.S., Kuttubayeva A.K., Kanimetova A.
Kyrgyz state university of I. Abrayev, e-mail: sharshenalieva@mail.ru

We have undertaken microbiological monitoring of nutrition products of animal origin (meat products) in turnover on the territory of the town of Bishkek and defined dynamics in revealing the products that does not meet requirements of normative documents. The objects of research were traditional and alternative methods of microbiological study of meat products. The research was made on the following microbiological indications: number of mesophile aerobic and facultative-anaerobic microorganisms, (bacterias of coliform bacillus group), Salmonella, Staphylococcus aureus, Escherihia coli, yeasts, and moulds. Normative values of definition of the above-mentioned indicators was set in accordance with the Universal sanitary-epidemiologic supervision, authorized by decision of commission of customs union. The received results and novelty: – for the first time laboratory examination took place upon generalized report data in regard to contents of micro-organisms in nutrition products of animal origin in turnover at the territory of the town of Bishkek during the period 2017-2019; nutrition products of animal origin were evaluated according to content of certain groups of microorganisms: – for the first time yearly dynamics (2017-2019) of revealing products that do not meet requirements of normative documentation.

Keywords: microbiology, safety, sanitary-indicational microorganisms, number of mesophile aerobic and facultative-anaerobic microorganisms, bacterias of coliform bacillus group, conditionally-pathogenic microorganisms, E. coli, S. aureus, sulphite-reducing clostridium, pathogenic microorganisms-Salmonella, organisms of spoiling: yeasts, moulds

Nutrition is one of the most important factors that define ecological-physiologic condition of human health and provide a complete function, adaptation abilities of an organism, and life expectancy.

According to the data of many scientists (M.P. Butko, 1994; N.R. Anosov, 2001, A.V. Aganin, 2002, L.V. Dracheva, 2007; V.A. Dolgov, 2005, and others), practically health of a person depends on nutrition, its structure, safety, and quality of the consumed nutrition products, majority of which is formed of products of animal origin. They serve as basic source of the most deficit complete proteins and other necessary nutrients for human organism. However, with products of human origin human organism can be penetrated by activators of infection diseases as well as products of their activity (toxins, ferments) that can often lead to local and general pathological processes on molecular, cellular, and organ level.

According to statistics, number of diseases, related to low-quality products grows every year, and, according to the data of State inspection of sanitary, veterinary, and phytosanitary safety by the Government of Kyrgyz Republic, the part of positive results of bacteriologic examinations of products of animal origin remains high still. The level of microorganisms' content nutritional cheese and dietary products in Bishkek has a great influence upon ecologic and microbilogical safety of products of animal origin, however, this question remain insufficiently-studied.

Materials and research methods

The object of this research is nutritional products of animal origin in turnover of the town of Bisheke. The research took place according to the following microbiological indicators: number of mesophile aerobic and facultative-anaerobic microorganisms, bacterias of coliform bacillus group, conditionally-pathogenic microorganisms, E.coli, S.aureus, sulphite-reducing clostridium, pathogenic microorganisms-Salmonella, organisms of spoiling: yeasts, moulds. The work implements a complex of methods: bacteriological methods, and also methods of analysis, comparison, and statistics. The research took place over the period of 2017 to 2019 at the department of General biology and technology of its mastering at faculty of Biology and Chemistry of Kyrgyz state university of I. Arabayev in collaboration with laboratories of the branch office of State inspection of sanitary, veterinary, and phytosanitary safety by the Government of KR.

Normative values of defining the above-mentioned indicators was set according to the Universal sanitary-epidemiologic and hygienic requirements towards goods subjective to sanitary-epidemiologic supervision, authorized by commission of the customs union.

Research results and discussion

Quality of meat and meat products is defined by a complex of microbiological, organoleptic, and physical-chemical indicators in accordance with requirements of current normative documents.

In microbiological evaluation of quality of meat and meat products quantitative and qualitative indicators are used. Quantitative indicators reflect an overall number of certain organisms in 1 g or 1 cm^3 of meat products.

Qualitative indicators reflect presence or lack of microorganisms of certain types or groups in a given mass of volume of a product.

Sanitary norms on meat imply revelation in meat products number of mesophile aerobic and facultative-anaerobic microorganisms (NMAFAnM), bacterias of coliform bacillus group (BCBG). During the research presence of microorganisms of all groups was defined in meat (diagram 1, diagram 2, diagram 3).

As presented in diagrams, study of 237 samples of meat in 2017 revealed 24 positive to the indicator NMAFAnM that equaled 10,1 % of the selection. In 2018 3 samples of 31 were positive (6,7 %). In 2019 of 73 studied samples 7 did not meet requirements of microbiological safety and sanitary norms according to NMAFAnM indicator (8,3 %).

Thus, the percentage of reveling increased number of mesophile aerobic and facultative-anaerobic microorganisms equaled from 6,7 % to 10,1 %. 237 samples of animal meat was studied in 2017 to presence of bacterias of coliform bacillus group (BCBG), of which 53 or 22 % contained an increased number of microorganisms of the named group. In 2018 they were located in 6 samples of 31 that formed 16,6 %. In 2019 of 73 studied samples 1 did not meet requirements of normative documents according to indicator of BCBG, revelation percentage equaled 1,38 %.

Annually percentage of samples that do not meet requirements of microbiological safety and sanitary norms by indicator bacterias of coliform bacillus group (BCBG) equaled 1,38 % to 22 %.

Over the period of 2017 to 2019 251 samples of meat semi-products were researched to the presence of the following microorganisms: NMAFAnM, BCBG, moulds and yeasts. 969 examinations were conducted. 26 positive samples were revealed (31 examination, of which NMAFAnM – 13, BCBG – 15, moulds and yeasts – 4). The percentage of revealing samples of meat semi-products that correspond to requirements of microbiological safety and sanitary norms equaled 4,8 %, 9,9 %, and 3,4 % respectively.

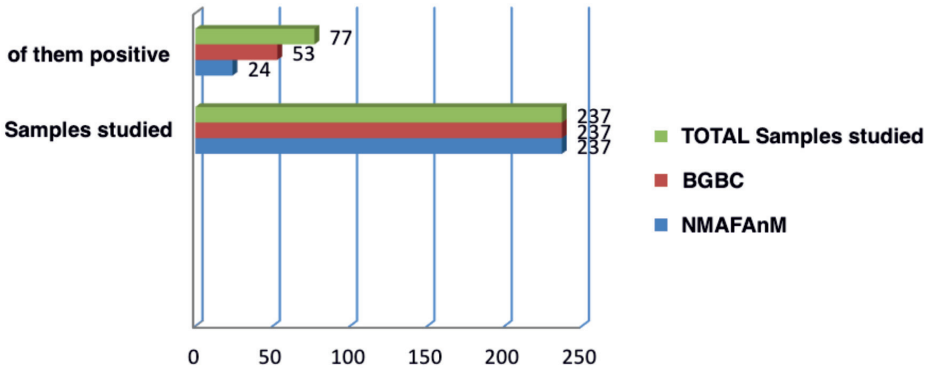


Diagram 1. Dynamics of revealing samples of meat that do not meet requirements of microbiological safety and sanitary norms in the town of Bishkek in 2017

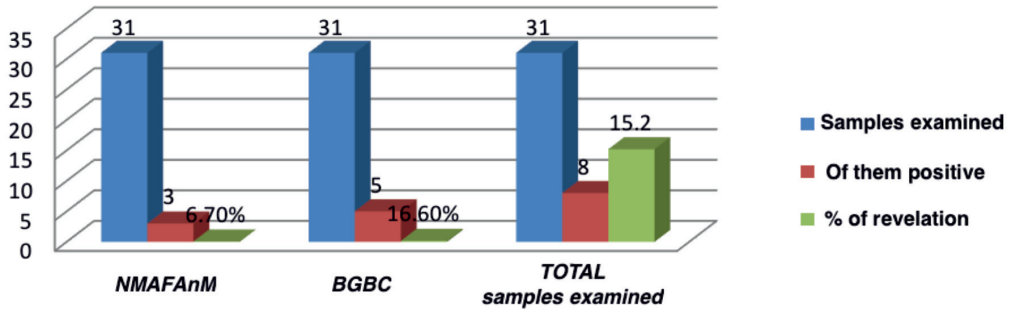


Diagram 2. Dynamics of revealing samples of meat that do not meet requirements of microbiological safety and sanitary norms in the town of Bishkek in 2018

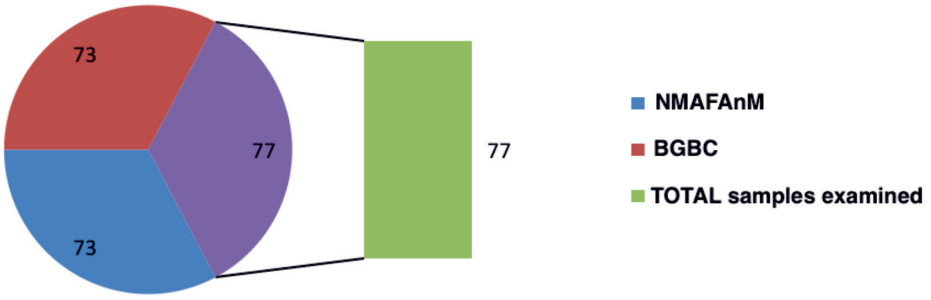


Diagram 3. Dynamics of revealing samples of meat that do not meet requirements of microbiological safety and sanitary norms in the town of Bishkek in 2019

Examination of 5 samples in 2017 to presence of moulds and yeasts did not reveal positive results. In 2018 14 samples of meat semi-products were examined, increased concentration of yeasts and moulds was registered for one of them (7,8%). Two positive samples of semi-products of 71, examined to this indicator, were revealed in 2019 (2,9%).

Thus, percentage of revealing samples that do not meet requirements of normative documents according to indicator yeasts and moulds equaled from 0 to 7,8 during the latest 3 years.

Samples were not examined to indicator Esherihia coli in 2017. In 2018 44 samples were examined, 9 of them were positive (18,6%). In 2019 23 samples were examined, no revelation cases were registered.

In 2018 23 samples were examined to presence of yeasts and moulds, of them 4 positive (13,6%). In 2019 three of six examined samples resulted unsatisfactory (50,0%).

According to sanitary norms and rules of researching meat of slaughter animals and poultry, as well as products of its procession (meat semi-products, prepared meat products, by-products) the following indicators are studied: number of mesophile aerobic and facultative-anaerobic microorganisms (NMAFAnM), bacterias of coliform bacillus group (BCBG), Esherihia coli, and also yeasts and moulds. During the research presence of microorganisms of all named groups was studied. As presented in table 2, examination of 1553 samples of meat and meat products in 2017 revealed positive samples according to NMAFAnM – 33 (7,6%), in 2018 291 samples were examined, 28 were positive (10,0%). In 2019 22 of 481 examined samples did not meet requirements of veterinary-sanitary rules and norms according to indicator NMAFAnM, and it equaled 4,5%. Thus, percentage of reveling increased number of mesophile aerobic and facultative-anaerobic microorganisms annually equaled from 4,5% to 10,0%. To presence of bacterias of coliform bacillus group (BCBG) in 2017 322 samples of meat and meat products were examined, of them 57 (17,5%) contained an increased number of microorganisms of the named group. In 2018 of 346 they were found in 31, that equaled 9,2%. In 2019 of 467 examined samples 12 did not met requirements of veterinary-sanitary rules and norms according to indicator bacterias of coliform bacillus group (BCBG), revelation percentage equaled 2,45%.

Annually percentage of samples that did not meet requirements of microbiological safety and sanitary norms according to indicator bacterias of coliform bacillus group (BCBG) equaled from 2,45% to 17,5%.

Of 44 samples of meat and meat products, examined in 2018 to presence of bacteria Esherihia coli 8 were positive it equaled 18,7%. In 2019 23 samples were examined. Samples that did not meet requirements of normative documents, were not registered.

According to indicator yeasts and moulds in 2017 5 samples were examined. Unsatisfactory products were not revealed. In 2018 of 36 studied samples 4 (11,6%) did not meet requirements of normative documents. In 2019 75 samples were examined, 6 of them – positive (6,7%).

To presence of yeasts and moulds in 2017 87 samples were examined, one of them – positive (1,12%). In 2018 of 109 samples 17 were positive (15,8%). In 2019 129 samples were examined, of them 7 did not meet requirements of normative documentation according to this indicator, and it equaled 4,8%. In total, over the period of three years intolerable amount of yeasts and moulds was revealed in 24 samples of nutritional products of 325 examined (6,8%).

During our research we made a retrospective analysis of the level of seeding of nutritional products of animal origin that was received for examination over the period from 2017 to 2019. The revealed microorganisms were divided into 3 groups (table):

– Sanitary-indicative (number of mesophile aerobic and facultative-anaerobic microorganisms (NMAFAnM);

– Conditionally-pathogenic: bacterias of coliform bacillus group (BCBG);

– microorganisms of spoiling (yeasts and moulds).

Proportion of each separate group in comparative aspect and dynamics to number of all revealed microorganisms was studied.

Thus, analyzing data of seeding nutritional products of animal origin with microorganisms showed us that the greatest number of the revealed microorganisms referred to sanitary-indicative group (89,5%). Conditionally-pathogenic microorganisms formed 5,1%. Microorganisms of spoiling – 5,81%.

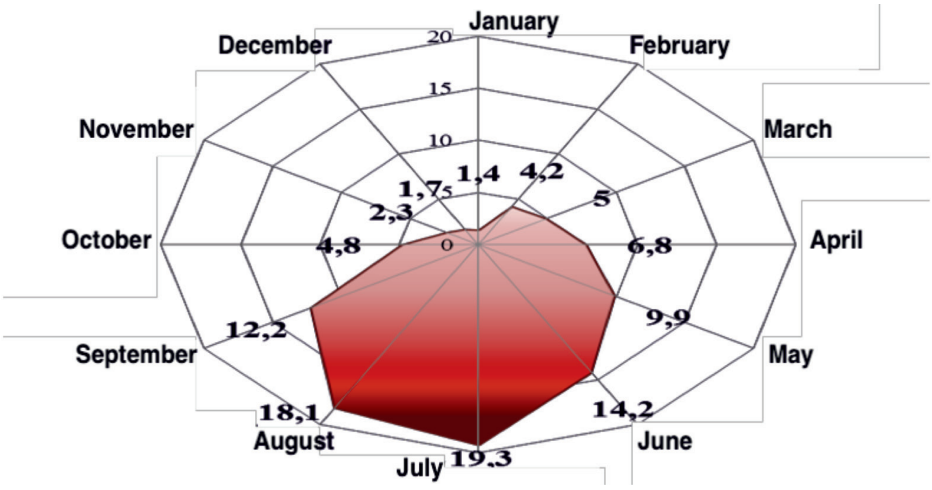
Analyzing cases of registering cases of nutritional products of animal origin that did not meet the requirements of normative documentation at selling points of the town of Bishkek over the period from 2017 to 2019 established that the highest rate of revealing unsatisfactory products to be located at Skotskiy market (12,5%). The second place is occupied by Oshskiy market (7,9%), Amedin-markets (7,5%). Following are market Bayat (6,2%), Orto-Sayskiy market (5,7%), market Kok-Zhar (5,0%), Dinar, market Alamedin-1 (5,0%), etc.

Based upon the results of our research as well as annual reports of laboratory of branch office of State inspection of sanitary, veterinary, and phytosanitary safety, we have analyzed yearly dynamics of revealing nutritional products of animal origin that does not meet requirements of normative documentation of the course of three years (picture).

From the material, presented in diagram, we can see that the majority of cases of revealing unsatisfactory products took place during the period from May to September (73,7%), peaking in July (19,3%) of all cases of revealing nutritional products that does not meet requirements of normative documentation.

Revelation of products of animal origin that does not meet requirements of microbiological safety and sanitary norms according to groups of microorgaisms

Group of microorganisms	Years			Total	
	2017	2018	2019	Saples	%
Sanitary-indicative	199	87	65	351	89, 54
Conditionally-pathogenic	2	16	2	20	5,1
Microorganisms of spoiling	1	17	5	23	5,81
TOTAL	200	120	72	392	100



Yearly dynamics of revealing samples of nutritional products that does not meet requirements of normative documentation

In our opinion, it is related most of all to the fact that climatic conditions of this period are the most favourable for reproduction of microorganisms. Therefore, inappropriate conditions of transportation, storage, and realization of nutritional products of animal origin lead to its rapid deterioration. Over the remaining 9 months (September to May) 26,3 % of the registered cases of revealing samples of nutritional products that do not meet requirements of normative documentation, took place.

Nutrition is one of the most important factors that define one's health condition and provide for reproductive function, adaptation abilities of an organism, workability, and life expectancy. According to many scientists, practically health of a person in 60-70 % depends on nutrition, its structure, safety, and quality of the consumed nutritional products, of which more than half is formed by products of animal origin. They are the basic source of the most deficit complete amino-acids and other nutrients, necessary for a man.

The main factor in transition of infection diseases are products of animal origin that often contain microorganisms that are activators of certain diseases. Emergence of these diseases is related to consumption of nutritional products (meat and meat products, milk and diary, fish, non-finfish, eggs, and egg-products) that were exposed to insufficient thermal procession, or their seeding by microorganisms during the process of production and storage. Providing quality and safety of nutritional products is one of the most urgent problems in Kyrgyzstan. According to statistics, number of diseases, related to low-quality products grows every year.

In this regard provision of high quality and safety of meat products is one of the basic factors in complex of measures aimed to establish microbiological safety and sanitary norms, directed towards prevention of nutritional diseases (infections and intoxications), preservation and improvement in health of population. This work is devoted to studying questions quality and safety of local products in turnover at the territory of the town of Bishkek, from the result of this initial research follows a general monitoring and a number of measures on establishing safety of meat products in turnover at the territory of the city of Bishkek.

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BIOCENOSIS, BIOCENOTIC DIVISION OF MAMMALS IN NATIONAL NATURAL PARK CHON-KEMIN AND CHARACTERISTIC OF CERTAIN MAMMALS OF THIS PARK

Sharshenaliyeva G.A., Beishenaliyeva S.T., Usengaziyeva G.S.

Kyrgyz state university of I. Abrayev, e-mail: sharshenalieva@mail.ru

This article characterizes division into biocenosis of national natural park Chon-Kemin (Kyrgyzstan). Species composition of mammals in this park as well as ecologically-dominant species are defined. National natural park consists of the following biocenosis: biocenosis of low-mountain steppe, mid-mountain biocenosis of high-grass lawns, biocenosis of fir forests and fir bushes, high-mountain biocenosis of lawn-steppe and alpine wastelands. After execution of field studies laboratory works were carried out in order to determine cariotype of certain species of mammals: common pipistrelle–Pipistrellus pipistrellus Schreber, grey hamster – Cricetulus migratorius Pallas, Tjan-Shan birch mouse – Sicista tianschanica Salensky, Tjan-Shan forest vole – Clethrionomys centralis Miller, narrow-skulled vole – Microtus gregalis Pallas. Regardless of the high geographic and individually-physiologic variability of Cricetulus migratorius, Pipistrellus pipistrellus, cariotypes of these species are stable in the most different points of their realm. Apparently, the main part in broad tolerance of certain mammals is defined by stability of cariotypes. Naturally, we can suppose that eurytopity of species is determined by inheritance, and the studied species are widely geographically-spread due to high adaptive potential of genotype, therefore, cariotypes of the studied populations are stable. For Tjan-Shan birch mouse, Tjan-Shan forest vole, narrow-skulled vole variability of cariotypes is reflected in special-biotopic chromosome polymorphism.

Keywords: National natural park, biocenosis, ecology, tolerance, species composition, mammals, rodents, population, stenotope, eurytope, endemic, cytogenetics, cariology, cariotype, polymorphism, diploid chromosome set, genofond, biovariety

Recently one of the main directions in biology is research in the area of preserving bioviriety, genofond of species and their bioefficiency, as well as their biocenotic division. Biovariety is studied at different levels of lively systems – species level, level of population and biocenosis.

History of studying biovariety of mammals in Kyrkyzstan began from classification and description of species in the second half of XIX century. The earliest data on mammals of Northern Tjan-Shan can be found in works by Pallas. Some data on mammals was collected in works by N.A. Severtsov (1857-1879), V.N. Shnitnikov (1936), N.V. Minin (1938). Later the research was resumed by S.I. Ognev (1928, 1947), A.T. Toktosunov (1958, 1972, 1984), A.I. Yanushevich, M. Aisin, A.K. Kydyraliyev (1972), E.D. Shukurov (1966, 1989), as well as other scientists who contributed greatly into research of spreading, morphology, nutrition, reproduction, and systematics of mammals of Northern Tjan-Shan. Due to inhabiting different biocenosis, populations of species of mammals adapted to the most various ecologic conditions. In this regard important is studying influence of different ecologic factors upon intraspecific variability of isolated populations. The importance of studying variability of populations in natural environment was specifically outlined by S.S. Schwarz (1980). As separate populations have their own biovariety due to variability under the influence of natural environment, these isolated populations serve as certain "natural laboratory" (A.V. Yablokov, 1987), and nature itself carries out experiments. As mammals are a part of lively nature, their comprehensive research and collection of scientific data continues.

Materials and research methods

5 species of mammals of Chon-Keminskiy population were studied: common pipistrelle, grey hamster, Tjan-Shan birch mouse, Tjan-Shan forest vole, narrow-skulled vole (10 specimen of each). Preparations of mytopic chromosomes were made from cells of bone marrow according to the methodic [20]. More than 2000 chromosome sets of each species were studied. Objects of field research for defining biocenosis of national natural park Chon-Kemin and ecologically-dominant types were expeditionary observations of mammals, carried out in the region of Chon-Keminskiy national natural park (1997-2018).

Research results and discussion

Dynamics and division of mammals in biocenosis

For the first time biocenosis of national natural park Chon-Kemin were divided. While dividing territories of National natural park Chon-Kemin into biocenosis we must consider vertical zonality of mountatins where the corresponding local areas of vegetation are formed. According geobotanic map and data of

K. Isakov (1959), as well as our data, territory of the park was divided into 4 biocenosis.

As valley Chon-Kemin is a mountain region, its vertical chains consist of different biotopes. In most cases a certain species cannot be found around the whole biotope, and, therefore, is spread in that local area of the biotope that corresponds to all ecologic requirements of this species. This area of the biotope was named by N.V. Minin (1938) as "space of life" and characterized by the fact that it has a limit of biological optimum for population of species. There are very few species of mammals that are satisfied with one life space, and in most cases they use the whole biotope. Certain eurytopic species of mammals (Mus musculus, Cricetulus migratorius, Ellobius talpinus, etc.) live in different ecological conditions, from by-mountain areas to mountain biotopes, for such species as Ochotona rutile stenotopity is typical, and they inhabit only biotopes of rocky deposits. "Space if life" for a species in certain cases can be spread over the whole realm or unevenly. In such conditions population of a species lives in similar biotopes, and sometimes they relocate from one biotope to another and create groups of specimen. While analyzing fauna composition of mammals by each biocenosis, this list does not describe in full composition of biocenosis. It seems that the main attention should be devoted to those populations of species of mammals for which high density in biocenosis is typical, so populations of these species form a "background" of this biocenosis. N.V. Minin (1938) underlines that ecologically-plastic species mostly live in one geographic realm in different biotopes, and they form heterogenous populations of species, in other words, ecotopes. Serafinski Wlodzimierz (1967) points out that many sub-species should be studied as ecologic populations, and sub-species – ecotopes are biomarkers of special characteristics of environment of the given realm, and these sub-species are geo-ecotopes. Supporting ideas of this scientist, we consider it necessary to study sub-species of mammals that inhabit Chon-Keminskiy national natural park as ecotopes of species, but not in status of sub-species. 37 species of ecotope mammals live at the territory of national natural park.

Biocenosis of low-mountain steppe

This biocenosis of low-mountain steppe is located along the driest expositions of the Southern slope of Keminskiy ridge, ridge Kok-Oirok, as well as Eastern end of ridge Kungei-Ala-Too, at the height of 1500-1800m above sea-level. Low-mountain biocenosis of steppe of the Northern type are vividly-expressed at the Southern slopes of Zailiyskiy Ala-Too ridge with different ecological conditions. In this biocenosis 20 species of ecotopes live. In biocenosis of low-mountain steppe of Chon-Keminskiy national natural park, in comparison to other species of mammals, frequently can be found tamarisk gerbil, and at night – eared hedgehog. Within agrobiocenosis of this biocenosis a wide spread of the following rodents is observed: house mouse, grey hamster, and mole lemming. During summer in populated areas common pipistrelle become active at evening-to-night periods, and their rapid flight can be observed. Mammals of this biocenosis are defined by certain bio-ecological characteristics, typical only for them

Mid-mountation biocenosis of high-grass lawns

Mid-mountation biocenosis of high-grass lawns are surrounded by biocenosis of low-mountain steppe from below and their upped border adjoints to biocenosis of fir forests and fir bushes. These biocenosis are mostly expressed in mid-mountain areas at the slopes of ridge Kungei-Alatoo, however, sometimes they advance into slopes of ridges of Zailiyskoye Alatoo and Keminskiye mountains. In this biocenosis totally 29 species of ecotopes of mammals. The most frequently-found are Kyrgyz vole, forest mouse, Tjan-Shan shrew. In rocky-rubbly caves colonies of sharp-eared bats can be found. This narrow line of mid-mountain biocenosis of high-grass lawns, located between tow biocenosis, can also be called ecotone, since between borders of communities there is no natural border, and high density of mammals is observed there. 80% of all mammal ecotopes of Chon-Kemin natural park live in mid-mountain biocenosis of high-grass lawns.

Biocenosis of fir forests and fir bushes

According to our observations, this biocenosis is spread in a broad line from East to West along the Northern slope of ridge Kungei-Alatoo, but in form of separate areas plantings of Tjan-Shan spruce can be found in depth of ravines of the Southern slope of ridge Zaaliyskoye Alatoo, specifically in ravine Karagailuubulak. Their lower border is located at height 1800 m above sea level, and to the East along with escalation of grounds the border is located at height 2000-2300 m above sea level, above which Tjan-Shan spruce can sometimes take shape of elfin wood. The main dominant in vegetation is Tjan-Shan spruce, pea tree.

For this biocenosis 24 ecotopes of mammal species are typical, main of which being Tjan-Shan birch mouse, Tjan-Shan forest mouse that are endemics. In this biocenosis forest mouse, boar, and narrow-skulled vole are frequently found.

High-mountain biocenosis of forest-steppe and alpine wastelands. This biocenosis is expressed at the Northern slope of ridge Kungei-Alatoo at the height of 2900-3100 m above sea level to 2600-3300-3900 m above sea level. It is located in the Eastern part of National natural park Chon-kemin. From West to East ground escalation increases, and therefore areas of biocenosis in these regions are represented by firn fields and ice caps. In places of high concentration of winter snow and along edges of slops alpine different-grass lawns can be found. At heights from 3800 to 4700 m above sea level prevail rocks, rocky slopes, and mountain wastes, country rocks, morainic debris, snow and firn fields, and also permanent ice caps. In total 20 species of mammals can be found in this biocenosis. In comparison to other biocenosis, here narrow-skulled voles, silver voles, and grey marmots can be found more frequently.

Populations of large species of mammals migrate from one biocenosis to another in search for food due to unfavourable changes in weather conditions depending on season of year. They live in biotopes of each biocenosis, finding "space of life" of a species, and diverse special structure of these populations can be observed.

During expeditions, along with collection of animals for cariologic analysis, we have also carried out initial quantitative accounting of number of mammals. But, we should like to outline that the received data on population of mammals in each biocenosis does not reflect a complete number of their populations. Our observations should be considered as initial information on ecologically-dominant species of rodents, background species, and which species has a high efficiency. Bioecological specific features, genetics, behavior, and their dynamics, as well as biocenotic interaction between animals are not studied sufficiently.

Characteristic of cariotype of certain mammals that live in biocenosis of National natural park Chon-Kemin

At current level of ecology development traditoinal approach proves insufficient, especially while studying stenotopic and eurytopic species of animals, as in this case cariotype can become if not the only, but most important indicator of diagnostics. Cariologic characteristics in combination with classic data on morpho-phisiological ecology provide for specification of stenotopic and eurytopic species within limits of geographic expansion. Thus, penetration of the results of comparative cariology into auto-ecology made it urgent to study inter-relation between tolerance and cytogenetic data of micropopulations of species. Therefore, we have studied cytogenetic features of certain mammals together with biocenosis of this park.

Common pipistrelle–Pipistrellus pipistrellus Schreber (Vespertilionidae, Chiroptera). The smallest of hand-winged, common pipistrelle is a synantrope animal, and it is widely spread in different populated areas that are defined by certain specific features of ecologic environment.

Data on cariotype of common pipstrelle is provided in works [8, 17], from which we know that diploid chromosome set of common pipstrelle of Polish population consists of 44 chromosomes, chromosome arm NF = 50. Autosomes of this cariotype consist of three groups of chromosomes: 3 pairs of metacentric, 1 pair of submetacentric, and 17 pairs of body-centric chromosomes.

We have studied cariotype of common pipistrelle of Chon-Kemin population that consists of 44 chromosomes. Autosome arms equal $NF^a = 50$ (*Fig.* 1).

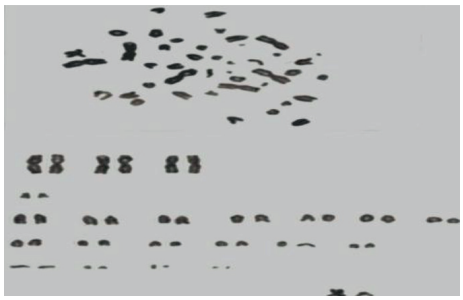

Fig. 1. Metaphase plaster and cariogramme of common pipistrelle (Pipistrellus pipistrellus Schreber) of Chon-Kemin population ($2n = 44$, $NF^a = 50$)

Autosomes consist of 3 pairs of large metacentric, 1 pair of mid-size submetacentric and gradually-decreasing line of 17 pairs of acrocentric chromosomes. Gender chromosomes of male specimen consist of metacentric X-chromosome and submetacentric Y-chromosome. Comparing the received data with other bibliographic information, we can establish special-biotopicstability of cariotypes of common pipistrelle.

Grey hamster – Cricetulus migratorius Pallas (Cricetidae, Rodentia). Grey hamster is a widely-spread species, these animals can be found in ecologically-diverse biocenosis up to 3600 m above sea level. Its tolerance to biotope is eurytopic.

Cariotope of grey hamster was studied for the first time [18], and the data [19] shows that cariotype of Turkish population consists of diploid set of 2n = 22 chromosomes and includes groups of 6 pairs of meta- and submetacentric, 5 pairs (including large sub-body-centric X-chromosome) of sub-body-centric chromosomes. According to the data [9], cariotype of grey hamster of Jumgal population and Kegetin population has diploid set of chromosomes 2n = 22, chromosome arm NF = 44. Apart from modal number of chromosomes it revealed poly-diploid cells. These changes are related to tectonic nature of the mountain Tjan-Shan, where realms of the mentioned populations are located.

We have studied cariotype of grey hamster of Chon-Kemin population. Its cariotype consists of diploid set of chromosomes 2n = 22, chromosome arm NF = 44. Chromosomes in cariogramme form 3 groups. The first group has a gradually-decreasing line of metacentric chromosomes. The second group consists of 1 pair of submetacentric chromosomes, the third – of 5 pairs of sub-body-centric chromosomes. Gender chromosomes are not identified (Fig. 2).

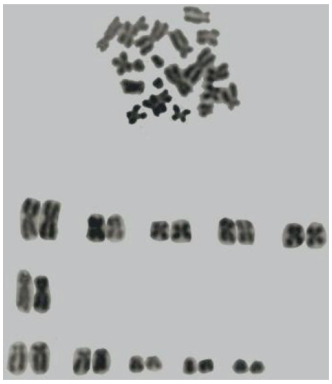

Fig. 2. Metaphase plaster and cariogramme of grey hamster (Cricetulus migratorius Pallas) of Chon-Kemin population (2n = 22, NF = 44)

While comparing the received results with bibliographic data we can establish stability of cariotypes according to morphology of chromosomes and underline relation between cariotype and ecological conditions of their habitat that allows us to use cariotype as bioindicator.

Regardless of high geographic and individually-physiological variability of Cricetulus migratorius, Pipistrellus pipistrellus, cariotypes of these species are stable in the most variable points of their realm. It seems that the main factor of high tolerance of certain mammals is stability of their cariotypes. Naturally, we can suppose that eurytopicity of species is determined by inheritance, and the studied species are widely-spread geographically due to high adaptive potential of their genotype, therefore, cariotypes of the studied populations are stable.

Thus, in modern researches on ecology of animal species data on comparative-cariologic analysis of inventory nature should be used widely in process of establishing eurytopic and stenotopic species.

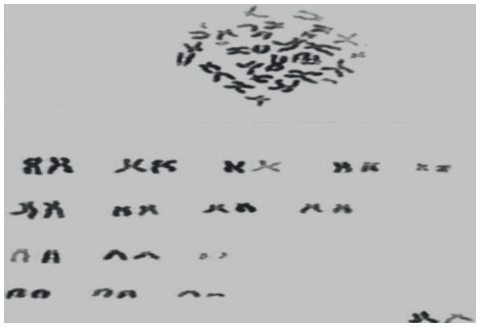

Fig. 3. Metaphase plaster and cariogramme of Tjan-Shan mouse (Sicista tianschanica Salensky) of Chon-Kemin population (2n = 32, NF = 44)

Tjan-Shan birch mouse – Sicista tianschanica Salensky (Mammalia, Rodentia). A small rodent, it is an endemic species of mountain Tjan-Shan. This local species of mammals lives in hiding, and its biology is not widely studied. While analyzing cariotype of Tjan-Shan birch mouse of Chon-Kemin population we determined that diploid number of chromosome set, as well as that of Issykul population [11], equals 2n = 32. But, in comparison of chromosome morphology of both populations we discovered their morphological variability. Cariogramme was composed for each group along with gradually-decreasing line. Autosomes consist of 4 chromosome groups. The first group consists of 5 pairs of metacentric chromosomes, of them two large, two mid-sized, and the last pair – of small size. The next group consists of 4 pairs of submetacentric chromosomes, of them one large, others

are mid-sized. The third group consists of 3 pairs of sub-body-centric chromosomes. Of them one large, one pair of mid-size, and the last is the smallest. The last group consists of 3 pairs of acrocentric chromosomes. Gender chromosomes consist of submetacentric and sub-body-centric. Chromosome set carries all types of morphologic chromosome structures. In each group chromosomes of different size can be found. We point out that according to the received data, cariotypes of isolated micropopulations of species Sicista tianschanica have spacial-biotopic chromosome polymorphism.

Tjan-Shan forest vole – Clethrionomys centralis Miller (Mammalia, Rodentia). It is a specifically mountain kind of voles. Tjan-Shan forest vole is an endemic of national natural park. According to our cariologic studies, cariotype of Chon-Kamin population of Tjan-Shan forest vole consists of diploid chromosome set 2n = 56. Chromosome arm NF^a = 56. Morphology of gender chromosomes differs slightly from bibliographic data [10]: X-xhromosome is of sub-body-acrocentric size, Y-chromosome is same in morphology, but smaller in size. Comparison between cariotypes of Almatinskaya and Chon-Kemin population revealed chromosome polymorphism. The discovered smallest metacentric chromosomes of Almatinskaya population are not found in cariotype of Chon-Kemin population. Morphology of gender chromosomes also varies. However, diploid chromosome set is same and equals 2n = 56. According to the received data on cariotype of this mammal, we can outline that cariotypes of separate populations have spacially-biotopic chromosome polymorphism.

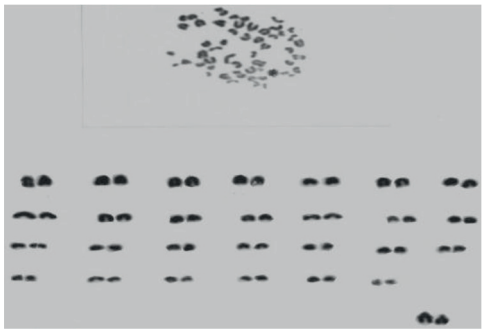

Fig. 4. Metaphase plaster and cariogramme of Tjan-Shan forest vole (Clethrionomys centralis Miller_) of Chon-Kemin population (2n = 56, NF^a = 56)

Narrow-skulled vole – Microtus gregalis Pallas (Mammalia, Rodentia). This species lives in high-mountain areas of national natural park. Colonial animal. Cariotype of narrow-skulled vole of Chon-Kemin vole consists of diploid chromosome set 2n = 36. Autosome arm NF^a = 50. Autosomes consist of 3 morphologic groups of chromosomes. The first group consists of 5 pairs of metacentric, the second group – 3 pairs of submetacentric, and the third group – 9 pairs of acrocentric chromosomes. All groups are composed along the decreasing line in their size. Geterochromosomes: X-chromosome is formed of large metacentric, Y-chromosome – of smaller acrocentric. In certain metaphase plasters in the 11 pair secondary constrictions were discovered. Cariotypes of narrow-skulled vole of Chon-Kemin population was compared to cariotype of (analyzed at department of general biology, ecology, and educational technologies of KSU of Z. Balasagyn, Kyrgyzstan) of Aksay population that consists of diploid number 2n-36, NF^a = 50. The compared cariotypes of populations are different in morphology of autosomes, as well as in morphology of geterochromosomes. Thus, at the foundation of these comparisons we can observe special-biotopic chromosome polymorphism of cariotypes of narrow-skulled vole.

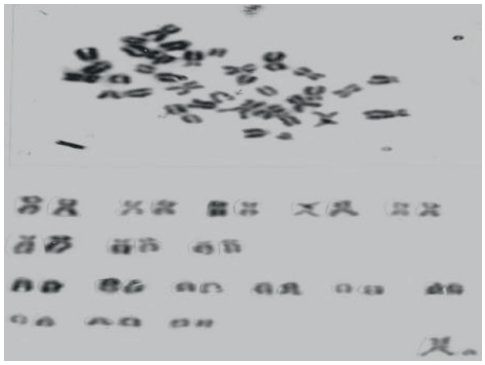

Fig. 5. Metaphase plaster and cariogramme of narrow-skulled vole (Microtus gregalis Pallas) of Chon-Kemin population (2n = 36, NF^a = 50)

According to the carried out cariologic research on cytogenetics of certain mammals of Chon-Kemin population, we can generalize the data, presented above. Stability of cariotypes of common pipistrelle, grey hamster in number of chromosome set and morphology in all studied "areas of life" is observed. For Tjan-Shan birch mouse, Tjan-Shan forest vole, narrow-skulled vole variability of cariotypes is expressed in form of spacial-biotopic chromosome polymorphism.

Thus, in modern research on ecological cytogenetics of species data of comparative cytogenetic analysis of inventory nature should be used widely in establishment of eurytopic, stenotopic, and genetically-stable polymorphic species of animals.

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ETHNOGEOGRAPHIC SITUATION OF THE BORDER AREAS OF KAZAKHSTAN AND RUSSIA

Egorina A.V., Salykbayeva G.M., Artemyeva K.A., Manapova Zh.
S. Amanzholov East Kazakhstan State University, Ust-Kamenogorsk, e-mail: av_egorina@mail.ru

The article discusses the concept of "border" and "cross-border" areas, elicited the degree of illumination on the subject. On the basis of the analysis of references, for formation of prerequisites of the cross-border region are found. The best practices of the advanced countries in creation of mechanisms of border cooperation are considered. The degree of necessity of development of this direction of interaction for Kazakhstan and Russia is defined. The paper presents the results of the analysis of statistical and cartographic material, based on the main features of the ethno geographic situation of the border areas of Kazakhstan and Russia which are formulated. The lists of ethnic groups of a border-zone with the greatest total specific gravity in structure of the population of the neighboring countries are defined. A brief excursion into the history of development and settlement of Altai as a region of unification of interests of the four states were made. The special attention is paid to the potential of the mountain system considered as a unique natural object with the richest natural reserves and opportunities.

Keyword: border areas, cross-border region, Kazakhstan-Russian border-zone, international cooperation, sociocultural space, ethnic identity, labor skills

The overall and irreversible nature of processes of integration and globalization of the international community causes formation of the uniform space which is characterized by availability among the states of political and economic arrangements. Feature of the modern international relations of regions is border cooperation within many vital issues of the states is solved. The problem of border areas plays a special role for Kazakhstan-a country with the 9th place in the world in terms of area, and enormously various of natural, economic, demographic indicators. The regions of Kazakhstan take a special place in the process of cross-border interregional cooperation and create opportunities for the development of close inter-state relations through the integration of intellectual, information, natural resources, as well as the rapprochement of people living in the border areas.

The historical events of the end of the 19th century have made fundamental changes to the political map of the world, have caused of the emergence of many new state borders. After the collapse of the Soviet Union and other socialist republics, 27 new subjects – independent states were created on the geopolitical map of the world. At the same time with loss of aged inter Soviet borders are arisen new uniform borders of the national states between federal republics. The research interest that has appeared on this basis from scientists is caused by the shift of semantic values and acquisition of the new statuses of state borders of the countries. The theoretical and methodological substantiation of the border areas has the most descriptive character and includes the knowledge from the field of history, politics and geography. The modern social and economical processes of border areas demand an integrated approach, a wide range of applied geographical research methods.

The purpose of the research. The main purpose of the research became the analysis of the ethno-geographical situation of the border areas of Kazakhstan and Russia and identification based on its similarities in the ethnic structure of the population.

The results of research and its discussion

The summary table was made on the structure of ethnic groups in East Kazakhstan, Altayskiy Kray and the Republic of Altay. The identical numerous ethnic groups and the specific weight of the ten largest ethnic groups in the structure of the entire population of the regions are determined and calculated. A similar ethnic appearance of the being considered territories have been identified.

To date, the subject of development and cooperation of border regions is sufficiently covered. Features of cooperation among countries within the border area are reflected in the works of V.V. Goncharov, S.G. Gorshenin, L.A. Gaynanov, P. James, P. Druker, Martin, I. Ansoff, F. Korzhunin, G. Murdal, N. Nekrasoph, and N.P. Nesterov.

The term "border area" refers to the social and economic zone along to the border or point in the deep of the country, within that observe border processes and phenomena related to the interests of neighboring countries and the interaction between their economic, cultural, legal and political systems [5].

L.B. Vardomskiy and S.V. Golunov characterize the border area as a zone covering the state border, checkpoints across the state border and related objects within the country,

border territory, airspace, cross-border water objects, internal sea waters, territorial sea, their underwater environment, continental shelf and exclusive economic zone [2].

In a more strict sense, border areas are those that are directly adjacent to the state border, are most affected by the border and the neighboring country and have a special, additional potential of development and international cooperation. It can be called the specific potential of the-border [1].

Over time, the border areas of neighboring countries can move into the category of cross-border, that is, the border areas of states characterized by a certain natural, economic, socio-cultural and ethnic unity. Integrated cross-border territories must be distinguished from the border, although for the latter, to a certain extent inherent the processes of integration. Our analysis of the literature allows us to identify the prerequisites for the formation of a cross-border region:

1) similar natural geographical environment of border areas;

2) the ethnic identity causing by uniform of sociocultural space, interaction and interference of cultures of the people;

3) the availability of economic, political, social, cultural complementarity;

4) the implementation of various kinds of interaction between neighboring countries, as well as the manifestation of the influence of various spheres of activity of states on the sides of life activity of the population;

Systemic development of border zone may contribute to the application of synergetic effect of joint solutions to common of various kinds' problems in the future. Extensive experience of such cooperation has been accumulated in Europe.

In the context of European framework of cooperation of border area communities and authorities, efforts are made to develop the regions of cities and rural areas, environmental protection, improvement of infrastructure and services to the population, mutual assistance in emergency situations. Interaction between the European border areas makes a significant contribution to the economic and social progress of the border regions, while forming a single spirit of friendship, the unification of the peoples of Europe [3].

The considered convention is actively used within the European Union for the purpose of elimination of a gap in social and economic development of the countries and regions and also strengthening of processes of integration. In a relatively short period of time, the activities of this Convention have resulted in significant achievements in the field of cross-border cooperation. Today it is a positive example of cooperation among cross-border regions and an incentive to create a mechanism of cross-border cooperation between Kazakhstan and Russia.

The development of cooperation within the border areas of Kazakhstan and Russia is due to the establishment of socio-economic relations. Analysis of statistical and cartographic material have shown that the ethnogeographic picture in the border areas of Kazakhstan and Russia has a number of features. First, the Kazakh – Russian border area is more densely populated than the Russian regions to the North and the Kazakh regions to the South. In fact, except for the west and east sites, the new border passed in many places on the middle of the main strip of resettlement of the former Soviet Union. Secondly, for example, in comparison with the border areas of the North Caucasus, where the new state borders divided the ethnic territories of Lezgins, Ossetians and other North Caucasian peoples, as well as the territory of the traditional residence of the peoples of Transcaucasia, the border of Russia with Kazakhstan passed across the territory of settlement of the Russian as the main state forming the people of the Russian Federation [4].

Evidence of the importance and need of studying of the Kazakh-Russian cross-border territories are enough today:

1) the length of the Kazakh-Russian border is more than 7500 km and it is one of the longest land borders in the world;

2) the Kazakh-Russian border passes in the center of the largest continent and divides Russia, and the countries of Central Asia is the largest state by area;

3) the border between Kazakhstan and Russia separates regions that are different not only on socio-economic indicators but also characterized by different directions of specialization of the economy;

4) to the both sides of the border are the largest cities of Kazakhstan (Aktau, Aktobe, Kostanay, Pavlodar, Ust-Kamenogorsk) and Russia (Novosibirsk, Samara, Chelyabinsk, Saratov, Togliatti, Barnaul, Orenburg, Magnitogorsk, Astrakhan), which are the most important centers of population, economy and culture;

The occurrence of the new state borders entails not only profound changes in the socio-economic, cultural and geographical spaces, but also is the reason for the conditional division of a single natural object into parts that

are influenced by different states. So it was happened with Altai – a unique mountain system located in the South of Siberia and Central Asia, which occupies a special place among the natural objects of our planet.

The first people had settled in the Altai valleys hundreds of thousands years ago that is evidenced by the world-famous Ulalinsky site found in Gorno-Altaysk. The rich history of this mountain system begins from the ancient Turkic era and the state of the Turks. Since 745 the territory of Altai is included into possession of the Uygur khaganate which gradually unites the lands of Altai, the Central Mongolia, the Southwest and significant portion of East Siberia, at the same time uniting representatives of many ethnic groups, religions and beliefs. During domination of kidany Altai becomes the center of formation of numerous ethnic communities which began to be exposed to processes of consolidation after disintegration of the Dzungarian khanate. The beginning of exploration of the territory of Altai by Russians it is considered the 17th century though the most notable population belongs only to the beginning of the 19th century when began to accustom the foothills and then Mount Altai by peasants of the Biysk district. From the second half of the 18th century has been taken place the formation of the Kazakh population of Altai, which have been reached high rates to the beginning of the 20th century. The numerous residences of ethnic groups of Altai within a single natural complex with similar climatic conditions, resources constantly were strengthened economic and cultural ties between them, that left a certain mark on their job, traditions, customs and lifestyle.

Thus, having seen a lot of historical events Altai is not only the cradle of history, but also the center of formation of many cultures and peoples, which had a great influence to the fate of other territories. Today Altai is a link between 4 countries: Kazakhstan, Russia, Mongolia and China. Having a common history of many thousands, Altai becomes a sphere of many political, economic, trade, transport and socio-cultural interests of these countries.

A special role in this world has the Kazakh-Russian border areas which located in the West Altay. Having arisen in the old developed area they are attended the mark of the history of settlement, which causes a similar ethnic structure of the territories (table).

On the both sides from the Kazakhstan-Russian border the population is characterized by multiethnic structure. More than 142 nationalities live in the Altay Territory, more than 100 in the Republic of Altay, and more than 90 in the East Kazakhstan. Despite the different nationality, there are observed a number of similar features in the structure of the population of the regions: 1) The Russian population either prevails or constitutes a significant share; 2) The list of the most numerous ethnic groups is identical; 3) The specific gravity of large ethnic groups is a significant share. Based on the analysis of the ethno geographic situation of the border areas, we have identified 10 largest ethnic groups living on both sides of the border, the total share of which in each of the territories under consideration is more than 97%. It should be concluded that this cross-border region is multinational and, as a consequence, multicultural.

The ethnic structure of Kazakhstan and Russia border areas for 2013

Nationality	East Kazakhstan	Altay region	the Republic of Altay
Entire population	1 396 593	2 419 755	206 168
Russian	561 183	2 234 324	114 802
Kazakh	781 732	7 979	12 524
Dutch	14 030	50 701	700
Ukrainian	7 078	32 226	1 010
Tatar	17 899	6 794	414
Belarusian	1 999	4 591	216
Armenians	756	7 640	528
Altaians	20	1 763	72 841
Korean	1 491	1 210	128
Azerbaijanian	1 373	4 950	307
And other nationalities	9 032	67 577	2 698

Conclusion

Altay, as a multi-ethnic region, requires a comprehensive historical and ethnographic research. The fact of the different political affiliation of the peoples inhabiting the territory of Altay, at first sight, acts as a barrier in their development. On the other hand, the most effective use of natural resources in this region is possible due to the ethnic identity of modern border areas. Altay peoples are united not only by the common historical past, but also, as a result, are similar in material and spiritual culture, many traditions and customs, type of economic activity and existing labor skills. They reflect the connection of the nature phenomena and the experience of agricultural work and life, accumulated in the process of centuries old history of each nation.

Accounting the labor traditions of ethnic groups living in the Altay territory on both sides of the border is necessary for the effective use of labor resources, as well as the rational placement of production. National features determine the needs for certain goods and services, are an important component in identifying the social needs of the population. Today, the Altay mountains are considered to be a storehouse of rich mineral resources, the unique natural landscapes, huge tourist potential. The using of the wide opportunities of this natural object implies a complex and large-scale study of indigenous ethnic groups-keepers of skills of interaction with this natural environment.

The national diversity of the Altay region is the most important value that is being able to enrich the range of economic, social and political opportunities of Kazakhstan and Russia. In this regard, the study of economic and social aspects of the border areas is the priority task of modern geography. In this context, the population of the border areas is considered not only as a labor resource and productive force, but also as an important link in formation of ethno-cultural image of the border.

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RELIGIOUS ICONOGRAPHIC REFORMS OF PETER I IN THE SIBERIAN NORTH

[1]Bortnikova Ju.A., [1]Naumenko O.N., [2]Naumenko E.A.

[1]Limited Liability Company "International Institute of Innovative Education, Professional Development Center", Tyumen, e-mail: oolgann@mail.ru;
[2]Yugra State University, Khanty-Mansiisk

The article is devoted to the development of icon-painting traditions on the Siberian North. This reform extended to all religious art of Siberia, including Islam, Buddhism, Judaism, Shamanism, but the task was not fulfilled even in the sphere of Orthodox art. The authors examine the influence of the government policy on the development of icon painting and emphasize the fact that this process mostly originated on the basis of the icon-painting class which belonged to Tobolsk's ecclesiastical seminary. After the Seminary opened in the 18th century, the icons had spread all over the Arctic and Siberian North for the Christianization of Finno-Ugric peoples and Muslim Tatars. However, the first iconographic traditions in Western Siberia were formed even earlier – in the XVII century. The formation of the Siberian icon tradition, however, was influenced not by the government policies, but the traditions of the Ural region, where Stroganov merchants organized the creation of iconographic canons – "The Stroganov iconographic original". Besides, two more specific tendencies were formed on the territory of the region: "folk" and "prison" icon painting, which could be studied beyond the seminary.

Keywords: Icon painting, icon-painting class, Tobolsk's ecclesiastical seminary, diocese of Tobolsk and Tyumen, "folk" icon, "prison" icon painting, Orthodox, Islam, Buddhism, Judaism, Shamanism

This scientific problem was considered from the perspective of art criticism [1, 3, 8, 9 et al], but the legal aspects of the reform have not yet become the subject of scientific research. The purpose of the article: to analyze the conditions of the reform in the Siberian North.

Tobolsk's ecclesiastical seminary was founded in 1743 on the basis of pontifical class, which had existed since 1703. An icon-painting class was officially opened at the seminary in 1800, but in fact the workshops, where masters shared their experience and skills with their disciples, had existed much earlier, since XVII century: huge Siberian region, captured with orthodox missionary, needed a large number of icons. However, whilst being an instrument of the spiritual impact on society, ecclesiastical orthodox art was under the control of the church and the government, this is why the formation of icon-painting tradition in Siberia became a complicated process.

On a national scale, in the beginning of XVII century the church paintings (frescos, iconography, mural painting) became the most developed kind of religious fine art in Russia; its canons and standards had already been worked out. An accurate system of religious art governance was also developed; on a national scale "Ikonny Prikaz" (1620 – 1640) gave birth to "Icon Chambers" at the Kremlin Armory, where the lessons were given. It is a common fact that tzar Aleksey Mikhailovich showed a great interest in the learning process of this school [3: 382]. Prokopiy Cherin, Fyodor and Istoma Saviny and others graduated from this school and through the Stroganov's "Icon Chambers" shared their knowledge with Siberian icon painters. There was a professional hierarchy of the icon painters in such schools: "appointee", "apprentice", "icon-painter", "master" etc., which corresponded to the established traditions and the spiritual idea of icon painting.

By the beginning of Peter the Great's reforms there were also the manuals on icon painting – "The Icon-Painter's Guides", which represented the collection of samples, which specified all the details of the canonical images of various individuals and events (up to the letter techniques), and were developed by the beginning of the government reforms of Peter I. There were two types of the Icon-Painter's Guides: explanatory and illuminated. An illuminated guide was a kind of an album depicting the saints, where all the images were placed in a chronological or thematic order. An Icon-Painter's Guide contained not only the instructions on the techniques of the icon painting, but it also comprised the masters' behavior, regulating strictly their whole life. It was stated that every "kind icon painter" should have his spiritual father and communicate with him as often as possible. Icon painter was recommended to be married "in order to avoid lust". In this respect, and also in some others, an icon painter became equal to a priest. His model of behavior was thoroughly prescribed: an icon painter should be sober, conscientious, selfless, God-fearing and lead an exemplary way of life.

Considering the role of the Stroganovs in the history of Siberia, the Stroganovs' icon-painting

tradition was specifically widespread in the region. Stroganov's original didn't yield to the famous Siyskiy's original in its' significance – they were both considered to be "the best" in the clergy community, but the Stroganovs' was on the second place [3: 381]; apart from it, Novgorodian icon-painting school became traditional. Within these merchant traditions a very rich decoration of riza was introduced. For example, one of the icons of the first Siberian governor M.P. Gagarin cost 130 thousands gold roubles [7: 41].

The beginning of the new stage in the development of the religious art is connected with the reforms of Peter I. One of the reasons for the reform was the appearance of a great number of non-professionally painted icons and also the ignorance of Icon-Painter's Guides by the painters themselves, which struck the prestige of the church badly. Moreover, the reform could have contributed to the replenishment of the state treasury, therefore there was an attempt to spread it on heterodox religious art: Muslim, Buddhism, Judaism and Shamanism, but this was done in vain. Consequently, in 1707 (13th February and 26th April) Peter I issued two decrees which regulated only icon painting [3: 319, 320]. The new management body was established by the decree made on 26th April, 1707; it was called "The House of icon-painting fixing". There was also a new post of the principal introduced, who got the right "to send the decrees to every town on his behalf" and to control the artistic quality of icons. The principal was inferior to the spiritual authority and was given clerks, both young and old, watchmen and soldiers of the Moscow garrison to be his assistants. Obviously, thispersonnel didn't correspond with the mission of the new managing body. Ivan Zarudny, which headed the House of icon-painting fixing, got an instruction form the Tzar. The essence of it was in twenty paragraphs, which were partly spread on the Western Siberia, while the second part turned out to be absolutely inapplicable due to the local peculiarities.

Paragraph 1 required to create lists of icon painters of the Russian government [3: 319]. Since the introduction of this order the number of icon painters in Siberia began to be recorded. Thus, according to the population census, conducted in 1788, there were 4 painters among tradesmen and 5 painters among craftsmen; in Tyumen – 3 icon painters, 2 apprentices and 1 disciple; by 1711 there were two more painters which appeared in Tyumen's census books [9].

Paragraphs 2–7 established a personal responsibility of icon painters for their work and distributed them into three categories. They also introduced a certification of the masters together with the delivery of the relevant documents ("lists") and other requirements, necessary for icon painters' organization: "Send the orders with the "marks", or in other words, with stamps made for the three categories, and with the names of iconographers, to bishops and to monasteries, to the priestsof the collegiate parish churches; without these "marks" the admission of icons is prohibited"[3: 319]. It was supposed that there should be a stamp of icon painters on each icon, which would confirm his qualification – a specific quality mark.

This condition, however, was contrary to the rules of icon painting: according to the tradition, there should be no painter's signature on the icon. At the best, a painter made a remark like this: "Painted by…" (it was supposed that the icon itself proceeded from God, who controlled the hand of icon painter), or there was a name of saint, whom the painter "wanted to reveal to the whole world through the icon" [8: 243]. In conditions of Tobolsk's icon-painting workshops these terms were difficult to accomplish because there were just a few masters, and for some of them icon painting wasn't even the core business. For example, by the end of XVII century – beginning of XVIII century a horse kazak N. Murzin and a bachelor V.N. Bogdanovych [9] were doing icon painting, and this was accepted by the local spiritual authority.

The only statement of this instruction which could be partially accomplished, but only after the death of Peter I, was the certification of the masters: everyone who finished the icon-painting class of the Tobolsk's ecclesiastical seminary, established in 1800, got a certificate. But even in the period of Peter's reign this was not enough for being included onto the emerging iconographer's workshop, because all certificates were not considered to be the lists of certification. Moreover, Peter I introduced a fee for getting "the lists with printed stamps": "1st degree – 1 rouble, 2nd degree – 75 copecks, 3rd degree – fifty copecks per man" [3: 320].

The rule, according to which "the lists" were given in the House of icon- painting fixing, made the situation even more complicated. Considering the fact that going there on foot would take 1,5–2 years and on a draycart – a few months (for example, it took the priest Avvakum 13 weeks to get to Tobolsk) [4: 16], including also significant material costs; for local icon painters this condition was practically impossible to execute. In fact,

the certificated masters were given a special salary as a reward, independently from the region where they lived. This is why after getting a cherished "list" it was better for the master not to return to Siberia. All this impeded the execution of the instructuion's statements.

Paragraphs 8–10 revealed prohibitions for the masters who didn't get certificates to paint icons secretly at home[3: 320]. They were allowed to work in the official icon-painting workshops, but there were some restrictions introduced: only those icon painters, who had 1st degree, had the right to take responsibility over the whole church's decoration (frescos, mural painting, icons and also carpentry work, carving and gilding of the iconostasis). However, due to the shortage of icon painters with the 1st degree in Western Siberia, this job was obtained by the mostworthy masters, but provided that Tobolsk's metropolitan gave his blessing. Paragraphs 11–15 regulated the process of passing on the masters' experience to their disciples; it was prohibited to stop improving one's skills of icon painting. Paragraphs 16–20 prohibited selling icons without special "marks" – certified stamps [3: 320].

The positions fixed in paragraphs 11–15 and 16–20, which were more focused on the replenishment of the state treasury than on fighting the wrong way of icon painting, were absolutely inapplicable to the painters in Western Siberia. Their realization threatened the destruction of the region's existing traditions of icon painting. It would have also brought church painting back to its original state, when icons were imported to Siberia. Meanwhile, in the first quarter of the XVII century the massive import of icons to Siberia had stopped, because this necessity provided by Stroganovs' "Icon Chambers" which were situated in the Urals. For example, according to the posthumous inventory of the property which belonged to Maxim YakovlevichSavin, made on 16th July, 1627, there were about 500 of both finished and uncompleted icons in one of the workshops [9].

As a result, the nonfulfillment of the Tzar's instruction gave an ambiguous result. On the one hand, the region's distant location, autonomy of the local authority and its lack of control – all that by XVII century had already created an opportunity for avoiding the execution of the order. On the other hand, the authoritarian rule of Peter I had already been felt: the tragic fate of he first Siberian governor M.P. Gagarinin, who was executed for his arbitrariness, indicated that there was a real threat for Tobolsk's clergy to fall out of favor too, especially when it came to the government finance [7: 121]. The situation became more complicated because of the Tzar Peter's notorious attitude towards the orthodox church: Peter allowed to remelt the church bells into cannons. In this respect Tobolsk's clergy showed a great courage – they acted in a way, which seemed to be the most rational and justified under these circumstances in order to save the icon painting class and to continue creating icons. Therefore there still were no stamps on the Western Siberia's icons. For instance, both Tobolsk and Tyumen's museums don't have such icons. Moreover, Tyumen's orthodox priests also deny having stamps on the icons in the functioning churches.

The bureaucratic principle of the fine art's regulation didn't bear any fruits: the Icon Painter's Guides were still being violated, the taxes were not paid. In 1722 Peter I had to make an announcement about the new stage of "icon-painting reform" in the presence of the Senate and the Synod. In fact, in many respects it was quite similar to the previous one. The researchers named the sanctions, which were presented within the reform, as "the censorship of icon painting" [5]. By the Holy Synod's order a special extract about saints' depiction was taken out of the existing instructions, written in 1667. Synod, for its part, complemented the extract with the list of prohibited icons, which were painted clumsily and ineptly [3: 319].

By the resolution of Synod, made on 21st May 1722, it was prohibited to have carved, trimmed, hewn and sculptured icons at home, made by un skilful or insidious iconographers, "because there are no painters chosen by God, and rude ignorants are willing to take their place" [8: 60]. However, Siberian spiritual authority couldn't completely execute this resolution because of its actual impracticability: "folk" icons (painted by common people) were a mass phenomenon. For example, there is an icon called "Chernushka" (an image of Mother of God, which was painted in Smolensk), which is kept in the collection of the museum of archeology and ethnography, which belongs to the Tyumen State University [2, Inv. № КП-327]. It is dated not just by the post-Petrine time, but by the end of XIX – beginning of XX century. The second example is the icon called "Krasnushka" (Christ Pantocrator) [2, Inv. №КП-314]. The presence of wooden sculpture ("carved icons") in the collections belonging to Western Siberia's museums also confirms this tendency and characterizes the peculiarities of Western Siberia's icon-painting traditions [6].

The icon called “Krasnushka” (Christ Pantocrator)

The existence of icon-painting class in Tobolsk’s penitentiary was another bright feature: it was called “a small icon-painting atelier” [4: 75]. It was created to educate the convicts both spiritually and morally, and also to attach them to Orthodoxy. The process was supervised by the Tobolsk’s spiritual seminary. The status of the prison icon painter needed to be deserved through repentance, confession, spiritual and physical purification, which were conducted through long fasting: according to the orthodox rules, the fasting before painting an icon could last for 40 days. Moreover, a man willing to become an icon painter ought to refrain from violating prison rules and law. Among the favorite icons, which were painted in prison, was the image of saint Anastasia. In ancient Rome she secretly came to prisoners and looked after them: fed them, cured and washed. She was depicted with a cross in the right hand and with a holy oil in the left. With this oil she cured wounds [1: 21].

Thus, despite all the government’s endeavors, the iconpainting on the territory of Tobolsk and Tyumen’s eparchy had been saving its originality for centuries, whilst developing in its own way. Icon-painting class was the central link, where the working process was conducted according to the rules of Stroganov and Novgorod’s schools. However, the regional peculiarities of icon painting had a large influence on the creative process and the meaning of the icon created.

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THE INFLUENCE OF M.SERDALIN ON THE FORMATION OF SOCIO-POLITICAL VIEWSOF THE KAZAKH NATIONAL INTELLECTUALS AT THE END OF THE XIX BEGINNINGOF THE XX CENTURIES

Ossipova Zh.K.

Kokshetau State University after name Sh. Ualikhanov, Kokshetau, e-mail: Osipova_saja@mail.ru

A bright representative of the Kazakh national intellectualsof the end XIX-beginning of XX centuries was a public and political figure of Northern Kazakhstan, the first Kazakh revolutionary, Democrat, historian and economist Mambet-Ali Serdalin. In the article the author examines a range of people, representatives of the Kazakh national intelligentsia, the formation of a worldview and socio-political views which had a noticeable influence M. Serdalin. A significant role in the formation of his personality had years of study at the Omsk Technical School (1885-1889). Omsk was the center of the Steppe Territory, where at that time the socio-political and revolutionary life was activated. As a student, M. Serdalin began his political activity, became acquainted with the political exiles of the city of Omsk, Petropavlovsk, Kokshetau, with whom he linked his further fate. Under their influence, the basis of his socio-political views included progressive, democratic views.

Keywords: Nauan Khazret, Akan-Seri, Sh.Kosshegulov, national intellectuals, socio-political views, democratic transformations, Kazakh society, socio-cultural community

In the study of national history,the studies of the life and work of prominent personalities hold pride of place, who being progressive representatives of their epoch, made a great contribution to the development of society.The Kazakh people in the nineteenth century put forward a brilliant galaxy of first intellectuals, distinguished by a social activism, grand-scale social, political and exploratory activities. In one of his works the First President of the Republic of Kazakhstan N.A. Nazarbayev noted, that "they considered one of the main tasks of their activities not only the preservation of the national identity of the Kazakh people, but also reconstruction of the historical pastand the education of national feelings" [6, p.p. 153-154].

The democratic transitions taking place in our country make an opportunity to come to grips with many historical events in a new way, objectively understand the facts and documents of our history and restore the missing pages of the past of Kazakhstan. Today is needed a multifaceted and objective approach to evaluating the activities of the national intellectuals, which reflects the moods and aspirations of certain groups and strata of Kazakh society.

At the turn of the XIX – XX centuries, Kazakhstan entered a new stage of its intellectual development. The adaptation of the traditional Kazakh society to the conditions and needs of capitalist relations, the dominance of the ideological attitudes of the metropolis, the growth of the socio-cultural community of the peoples of the Eurasian space led to the birth of the Kazakh intellectuals of the new formation.In the public mind, she had established herself under the name "okygandar" – "educated" and "ziyalylar" – "intellectuals".

The tumultuous eventsof the beginning of XXcentury brought to the forefront of history a whole galaxy of public and political figures from among the Kazakh national intellectuals. Among the Kazakh progressives of the end XIX-beginning of the XX centuries was a social and political figure of Northern Kazakhstan, the first Kazakh revolutionary, Democrat, historian and economist Mambet-Ali Serdalin (1865-1914).

Of particular interest is the circle of people with whom M. Serdalin communicated, indeed many of them under his influence formed their worldviews, socio-political views, ideals. Contemporaries of the Mambet-Ali Serdalin's era were prominent political and public figures of Kazakhstan like Alikhan Bokeikhanov, Bakhytzhan Karatayev, also well-known respected people of the Kokshetau land such as the well-known composer Akan-seri, scientist-theologian, mullah Nauan Khazret, deputy of the I and II State Duma Sh.Kosshegulov, public politician A.Turlybaev.

One of the close friends of M. Serdalin was Alikhan Bukeikhanov – a prominent public, not only Kazakh, but also Russian statesman, Deputy of the State Duma, facilitator and leader of the national democratic party "Alash", an outstanding scientist, economist, historian, publicist. Acquaintance of two representatives of the people happened in student's years, within the walls of the Omsk Technical School.

The acquaintance of two young men played a significant role in the formation of their political views. It is just cause to say that through M. Serdalin, being a young man, A. Bokeikhanov received the first ideas about the social and revolutionary life of Russia.It was here in

Omsk,a youth of eighteen, the future leader of the Kazakhintellectuals, thoughtabout the nature of good and evil, he was faced with the question of the fate of his people. And this happened by virtue of the acquaintance with Mambet-Ali Serdalin.

Being a student, he, as M. Serdalin, actively participated in the political life of the city. Successfully graduatedthe Institute of forestry in St.Petersburg, A.Bokeikhanov in 1894 returned to Omsk.First, he worked as a teacher in a forest school, and then participated in the expedition of F.A.Scherbina to explore the steppe areas, later for some time in the service in the resettlement administration.F.A. Scherbina wrote that A. Bokeikhanov from the very beginning participated in the expedition's affairs and "thanks to the knowledge of the Kyrgyz language, he replaced two people with his own – the statistics and the translator" [8, p. 187]. Leading scientist A.A. Kaufman, who audited the expedition's affairs as an inspector of the Ministry of Agriculture and State Property, called him a "valuable worker", "closest employee". A. Bokeikhanov introduced many new things to the survey methodology, bringing it as close as possible to the economic and social realities of the Kazakh aul.

During the revolution of 1905-1907, A.N. Bokeikhanov was in the bosom of thesocial life of the Steppe Territory.He becomes a member of the Cadet Party, believing that the ideas of this party to some extent correspond to his ideas about possible ways of self-determination of the Kazakh people.One of his friends with whom friendly relations had not lost was M. Serdalin.

Many things united M. Serdalin and A. Bokeikhanov. Being constantly in the thick of political life, they formed a political outlook. This was mainly reflected in the question of land law. In addition, Mambet-Ali and Alikhan were contemporaries of the period of active colonization, political and administrative reforms in Kazakhstan, which caused significant changes in the social, political and legal life of Kazakh society.Being witnesses of the social and national oppression of the indigenous population, the young Kazakh intelligentsia could not be indifferent to the further fate of their people.During this period, M. Serdalin and A. Bokeikhanov took an active position in solving the agrarian and resettlement issue. They openly opposed the tsarist officials, criticized the colonialist policy of tsarism.

M. Serdalin and A. Bokeikhanov chose "freedom, equality, brotherhood" as a life credo, and they believed that the path to the freedom of their people lies in the struggle against tsarism and colonialism and on this path they made deliberate steps.

Among the Kazakh young intellectuals at the beginning of the 20th century, occupies a worthy place a close friend and fellow student of M. Serdalin at St. Petersburg University Bakhytzhan Karatayev, whose fates intersected by the will of fate.The writer N. Magzumov in his exploring mentions the existence of photography, where A. Bukeikhanov, M. Serdalin and B. Karataev are depicted in the photo [4, p. 156].

Bakhytzhan Karatayev had a legal training. In 1907 he was elected to the Second State Duma from the Ural Region as part of the Muslim faction.He actively used the rostrum of the State Duma to promote the ideas of the Kazakh patriots about the need for a new agrarian reform, and to review the government's resettlement policy. B. Karataev made a great contribution to the development of the national liberation movement of the Kazakh people, especially in the period of 1905-1907.Thus, we see that M. Serdalin was not alone in the struggle against the policy of tsarism.His younger contemporaries, representatives of the national intellectuals like A. Bokeikhanov and B. Karataev were followers of his social and political ideas, who laid the foundation for democratic movements.They left a significant mark in the development of the national liberation movement of the Kazakh people and in its spiritual resurgence.

The names of Alikhan Bokeikhanov and B. Karatayev do not cover the list of M. Serdalin's associates. Along with them, we can name well-known personalities, social and political figures – the Kokshetau people. Among the people around M. Serdalin, the place of honor is held by the great composer Akan – seri, who was his spiritual mentor and teacher. In addition, he was a fellow villager of Mambet-Ali Serdalin. Well-known Kazakh writers and researchers like A. Zhubanov, B. Erzakovich, S. Seifullin, M. Auezov, S. Mukanov, I. Zhansugurov and many others studied his poetic heritage.

The great composer Akan-seri (real name Akzhigit) was born in 1843 in Koskol district, present-day Ayrtau region, where Mambet Ali was born. After the personal tragedy, Akan-seri took a different view of what was happening. He took lessons from the famous Mullah in Kokshetau, a public person Nauan Khazret. Akan saw in him not only a wise man, but also a spiritual guide. In addition, they were brothers-in-law. Inspired by religious teachings,

Akan sought thereby to find peace of mind in religion. Here he realized that the teaching of religion is an instrument of oppression in the hands of the ruling elite. It should be noted that Nauan Khazret influenced the formation of his new views on the policy of the authorities [5].

Akan-seri had many friends and followers, mostly people of advanced, progressive views like Seraly, Tleubai, and Zhamshit including his student Mambet-Ali Serdalin. Even in his youth, Mambet-Ali knew and often talked with the singer.Listening to Akan, he was amazed at his folding mind, eloquence and masculinity.

According to the memoirs of M. Serdalin'scountryman Khamit Tleubaev, it was known that, being a student, M. Serdalin, coming to his native village, first of all went to the respected composer.The singer joyfully met a young student whose friendship lasted for a lifetime [6]. M. Serdalin liked to listen to the akyn, through whom he met the oral folk art of the steppe people. Akan-seri asked him about political events in the Russian capital and other matters. In turn, M. Serdalin had a noticeable influence on the formation of the political awareness, the public views of Akan-seri. These were not only conversations as a mentor and disciple, but already as two public figures who, in society, openly expressed their free views in relation to the colonial position of the Kazakh people, while criticizing the tsarist immigration policy. Akan saw in Mambet-Ali an educated man of progressive ideas and believed in his future.When Akan-sere died in 1913, Mambet-Ali convened not mullahs, but akyns and singers. A lot of people gathered over the grave, where Mambet-Ali made a touching speech. The sons of M. Serdalin Khusain and Rustem invited from the Russian village masters – carpenters, who built a rich gravestone on the grave.

In the struggle against the colonial policy of tsarism in Kazakhstan M. Serdalin was not alone. A public figure, a well-known mullah Nauan Khazret (real name Nauryzbai Talasov) took active participation in this movement. Alikhan Bukeikhanov wrote about him as a famous scientist in the Kazakh steppe. Nauan Khazret was an educated man, a clergyman, and enjoyed great respect from the people. The exact date and place of birth is unknown. However, it is known that his parents lived in the mountain area Zhylgeldi, near the village of Baratai, Kokshetau district.He studied at the madrassah in Bukhara. He, along with the Old Turkic, Uzbek languages could speak Farsi and Arabic. He was a scholar and theologian and became popularly known as Nauan Khazret.

According to the choice of the public, in 1886, Nauan – Khazret was approved by the Regional Government asthe mullah of the Kokshetau cathedral mosque. Nauan – Khazret did a lot in the enlightenment of the population. Thanks to him, a new mosque was built in the center of Kokshetau. Being well-educated, Nauan Khazret advocated for the broad enlightenment of his people, and organized something like a madrassah at the mosque to raise the qualifications of rural mullahs.In this case, M. Serdalin made considerable efforts. The peculiarity of this institution was that students received education here free of charge.Another feature of the madrassah was that the process was not limited to religious teaching.As a school assistant, NauanKhazrettook on his former student Shaimerden Kosshegulov. In the classroom at the madrasah Nauan Khazret spoke about the need to acquire present knowledge, spoke and in fact carried out the modernization of traditional education, believed that Islam should be preached in their native language [1, p. 173]. Nauan-Khazret and M. Serdalin were united by the fact that they saw the meaning and purpose of their life in serving their people, took care of their moral improvement. As public figures, they put a lot of effort and did not allow the authorities to break the traditional culture of the Kazakh people.

Exploring the inner circle of M. Serdalin, we cannot fail to mention the well-known public and political figure, enlightener Shaimerden Kosshegulov. In his day in the letter to Abai, he wrote: "We will raise the banner of unity; we will not allow tramplingnational pride, we will show the world that we are a worthy people" [7, p. 57]. According to the reports, he was born in 1874 in Kotyrkul district of Kokshetau division of Akmola region. In childhood, he received a fairly wide education at that time. He continued his studies in the madrasah of Nauan Khazret, where he began studying the sciences. Especially heartily, Shaimerden comprehended the basics of Muslim law and promulgated his position among the population, defended mercy and humanistic spiritual values, criticizing violence and oppression.

On the formation of his worldview had a huge impact his teacher and mentor Nauan Khazret and Mambet-Ali Serdalin. Shaimerden Kosshegulov was one of the first Kazakh deputies elected to the State Duma. Participating in the second State Duma in 1907, he wrote about the forced rejection of land from the Kazakhs, demanded to return to the rightful owners of the land, which were in order to encourage and reward allocated to officials and officers who

pursued a policy of expansion against the indigenous people for the resettlement of people from the Central regions of Russia. After the election as the Deputy to the second Duma Sh.Kosshegulov turned out to be in St. Petersburg. Here he raised his political outlook.

What did unite M. Serdalin and Sh. Kosshegulov? First, they were people of the same epoch who chosen a creed to serve their people. Secondly, they were united by common ideas, plans, the main goal of which was to lead the people on the path of independence, to free access to land, to the evolution of a language and faith of the Kazakh people.

Among the public and political figures of Northern Kazakhstan, the name of Aidarkhan Turlybaev occupies a worthy place. His personality is not widely known. Nevertheless, A. Turlybaev played a certain role in the formation of the Alash movement in the region and was one of the implementers of the idea of the national statehood.

A. Turlybaev was born in the village Talap of Mizgil district of Kokshetau division of Akmola region. After receiving primary education in school, he entered the Omsk gymnasium, from which he graduated in 1897. In the gymnasium, he was characterized as an impeccably disciplined and inquisitive student. After graduating from high school he, in 1897, entered the St. Petersburg University Faculty of Law. During the period of study at the university, A.Turlybaev was characterized as a student of "excellent behavior" [3, p.13]. During his student period in St. Petersburg, A. Turlybaev met and kept in touch with prominent public figures, like Sultan-Gazy Ualikhanov, A. Bokeikhanov, M. Dulatov, B. Karatayev, and his countryman M. Serdalin. Here he maintained friendly relations with some Russian democrats, which could not but influence the formation of his political views.

After graduating from the university, A.Turlybaev in 1902 took service in the Omsk Court of Justice, where he was involved in the position of the World District Judge. Later he joined the Alash party. As it was known, on the eve of the events of 1917, A.Turlybaev continued to perform the duties of barrister.

Particular influence on his socio-political views had his close relationship with M. Serdalin and Nauan Khazret. As you know, together with Mambet-Ali Aidarkhan helped, as an accomplished lawyer, in drafting a petition for the release of Nauan Khazretand Sh. Kosshegulov.

Thus, exploring the innercircle of M. Serdalin, we see that it consisted of outstanding personalities of progressive-minded public politicians in Kazakhstan, whose formation of worldview was played by M. Serdalin himself. It was at that difficult time, when the Kazakh people were at a crossroads, on the historical stage, that young intellectuals came out, which later was able to bring to life their thoughts and democratic ideas and contribute to the progress of the Kazakh region, leaving their people a priceless legacy.

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THE ADAPTATION ISSUES OF THE KAZAKH SOCIETY FROM THE PEOPLE'S REPUBLIC OF CHINA TO THE EVERYDAY LIFE IN THE VIRGIN LAND

Shukeyeva A.T.

Kokshetau State University after name Sh. Ualikhanov, Kokshetau, e-mail: ainur_shukeeva@mail.ru

Chinese Kazakhs are an integral part of a unified Kazakh society. The socio-economic, political system of the People's Republic of China, which has a great influence on everyday life, has in fact been a targeted state policy for more than two centuries in relation to national minorities. To understand this phenomenon in recent and current historical processes in Kazakh society, we need to consider ethnic history on the one hand in the discourse of ethnic integrity and ethnic settlement of the Kazakh ethnic group without limiting it to the current political boundaries of Kazakhstan. On the other hand, we will also consider a separate microhistory of the daily life of Chinese Kazakhs as an important component of a large Kazakh ethnic group. Chinese Kazakhs were traditional part of the Kazakh community, which preserved their nomadic life and customs. The most important thing is that the opportunities for livestock farming are limited in the areas where the grain is extracted first.

Keywords: society, adaptation, daily life, immigrants, ethnos, irrident

Chinese Kazakhs are an integral part of a unified Kazakh society. The socio-economic, political system of the People's Republic of China, which has a great influence on everyday life, has been the policy of the state for more than two centuries in relation to national minorities.

To understand the phenomenon in the recent and current historical processes in the Kazakh society, we examine the discourse of ethnic identification through its historical ethnic settlement, without limiting the history of the Kazakh ethnos to the modern borders, on the other hand, the personality of Chinese Kazakhs, from the point of view of microstructure.For this purpose, we have to make a brief tour of how the Chinese ethnic Kazakhs were formed.From this point of view, first of all, it should be noted that today's political territory of Kazakhstan does not correspond to the ethnopolitical territory of the XVIII century until the first quarter.Particularly part of its ethnic territory, especially in the North-East and South-East, has crossed the borders of neighboring countries in several historical periods, depending on different political conditions.In particular, in the 40-50s of the XVIII century of the Russian Empire in connection with the construction of the boundaries of "Novoishim" and "Irtysh" the Kazakhs lost 250 thousand sq. Km, in 1757 after the defeat of the Dzungaria by the Manchu-Chinese people were massacred genocide, The ancient settlements of the Kazakhs occupied by the Dzhungarian-Kalmyk in Ili, Tarbagatai, Semirechye, Southern Kazakh Altay In the 50-60th centuries of the XVIII century, as a result of the occupation of the Manchur-Tsing Empire, instead of the former Dzungarian khanate China's new administrative territory "Şınjan" was included in the Territory. [15,138].

Kazakh Khan Abylay khan came to these three regions during the liberation of the Kazakh lands from the Oirat Jungars and negotiated with the Qin government, which eventually came to the region, mostly the Ablai Khan who ruled over the Middle Ages, the Nile and Kerian, received.Itwas obliged to pay for the land a hundred shekels of cattle. The border between Kazakhstan and China has begun to emerge since then [1,132]. In the Chinese historiography, the historically groundless thesis that the Shizan was an integral part of the Chinese territory was the result of the use of force majeure in China. [16,42]. In 1858, orientalist ChokanValikhanov, a well-known traveler who accomplished a strategic geopolitical mission of the Russian Empire, made a special trip to the six cities in East Turkestan,points out the weakness of the Chinese authorities in East Turkestan, the historicality of ethnicity, ethnocultural, political and religious ties between the Turkic peoples in West Turkestan.This is a very important research that allowed us to conclude that the Russian Empire would be the basis for a bold policy initiated in the region. However, the Russian side could not rationalize and weaken the power of the Tsing Empire in the newly conquered territory because of the pressure from the Western countries [17,432]. During the Typhins uprising, the Turkic-Muslim peoples of the region rebelled, it was the time, when the fall of Chinese rule, notwithstanding that in 1871 with the support of Kazakh volunteers Russian troops were brought to the Ili region, in 1879, Russian troops were evacuated. The Russian authorities have been dealing with the issue of determining

the border with China, which resulted in the signing of the Beijing Agreement on November 2, 1960, the Protocol to the Protocols in 1864, the Hobbit Protocol in 1969, the Tarbagatay Demarcation Protocol in 1870, the Livadian Agreement in 1879 and the St. Petersburg Agreement in 1881 [13,8-9]. Thus, Kazakhs have become a divided Kazakh nation, which has become part of the empire. These actions have a negative impact on the destiny of the future Kazakh people and their migration routes. Kazakhs lost their homes in Ile and Tekes. In 1892, the Chinese side completely banned the transition to the comfort of the Kazakhs. According to researcher Mendikulova, the Kazakhs in those places are not diaspora but rather the irridders who have been practicing for centuries in their own country. [14]. The absolute majority of the people living abroad are not Kazakhs, but Kazakh irradiators in Russia, Uzbekistan and China. Sh. According to the research institute named after Valikhanov, 40 % of the total Kazakh nationality lives abroad.Chinese Kazakhs are the largest ethnic group in the world, reaching 3 million people (official Chinese statistics dropping 1.5 million Kazakhs during the last quarter century), from unofficial Kazakhs in this category.That is why the history of the Kazakhs in Kazakhstan, which was part of the influence of Chinese Kazakhs and Russian influence, remained indifferent to one another.Kazakhs from both sides, due to the colonial policy pursued by the imperial states, have crossed the border to China and then to the USSR.The ordinary Kazakhs who suffered from socio-political and cultural pressures did not feel comfortable in China or in the USSR.Particularly in the first half of the twentieth century the traditional culture and spiritual culture of Kazakhs in Russia and China came to the end with the systematic destruction of the system. It was a consequence of one of the two states that one of the two nations had seen a great deal of suffering and suffering.

The Kazakhs who have been rebelling against the siege of Russia and the USSR by various social and political events have been increasing the number of Chinese Kazakhs.In 1943, the number of Kazakhs in the China region reached 930,000, but by 1954 the number of the Chinese census was reduced to 421,000, or 45 %. It was shown in the work of an English researcher Godfrey Lys“Kazak Exodus” which was published in 1956, he wrote about the tragedy of the Kazakh people in Himalayas and the Tibetan, and it was translated into Kazakh in 2018.According to the British researcher, only one-quarter of the 20,000 Kazakh families, who went to East Turkestan in 1948, landed in Turkey and found survivors interviewed by live eyewitnesses [11].

And a group of Kazakhs, especially those who arrived in China during the 1916 uprising and collectivization, re-emigrated to Kazakhstan since 1944.If before the 1950s smaller groups of Chinese Kazakhs had come to Kazakhstan, the toughening of Mao’s policy toward national minorities forced them to mobilize, ie, Chineseization, the return of Chinese immigrants increased the sense of Chinese Kazakhs’ relocation to Kazakhstan.Moreover, the life of the Kazakhstani side was considerably improved over the 1950s than in China. At this very moment, the beginning of the raising campaign in Kazakhstan has created a favorable environment for migrants from the People’s Republic of China.The Moscow Center provided a huge amount of funding and provided a set of social benefits for the settlers. Moreover, the policy of Stalinism has slowed down, and social and economic life has become more attractive for the Chinese Kazakhs.

2 million people from the European part of the USSR were brought to Kazakhstan in 1954-1962. That is why the Kazakh people have become minorities in their own country. According to the 1959 census, the number of local people living in the country was 2 million 787 thousand, i.e only 29 % of the population. Only in the first stage of the raising campaign (1954-1956), according to the study of ethnodemographics 650 thousand people were resettled [2,144]. As a result of mass resettlement of the former USSR mainly from the Slavic republics, researcher A.M. Zharkenova concludes that North Kazakhstan has formed a large-scale socio-cultural and ethnocentral zone belt. However, the migration process was stronger amongst the migrants. The Republic suffered from financial losses due to those who went to the new regions. In that regard, the leadership of the Republic at that time believed that Chinese Kazakhs, who are eager to move to Kazakhstan, should be involved in one major socio-economic action.Nevertheless, the Central Authorities did not fully support the wishes of the republic, but also created opportunities for them. The Council of Ministers of the USSR in 1954 On April 16, in accordance with a special secret decree No 751-329, in June and August, the Council of the People’s Republic of China adopted a resolution on the transfer of Soviet citizens to the development of virgin lands and in 1955 On September 17, № 1701 adopted the resolution on “Repatriation of Soviet citizens and their employment in the USSR” [3]. In this

regard, residents of Kazakhstan came from the Western Republic of the USSR, but also from the People's Republic of China. These measures were particularly important for the populations in North Kazakhstan, where the proportion of the local population fell sharply.In 1955, by the decision of the USSR Council of Ministers 7465 families moved to the Kazakhstani state farms from the People's Republic of China, totaly 39,467 people, including 13,000 people were disabled. [5]. They were mainly Kazakh and Uighur people. At that time, 505 Uyghurs were resettled in our country. [6]. Almost all Uyghurs have been settled in Almaty, Zhambyl, Taldykorgan, and often have been asked to move to Zharkent, Uyghur. At the same time, Kazakhs from China were living in northern regions.

Acceptance of "Soviet citizens" from China was carried out in a special order. From Horgos station to Saryozek, and subsequently through three reception points at the Ile, Ayagoz and Otpor stations.Each reception center was headed by representatives of the Union and Ministry of Agriculture, Public Works and Transport and Transportation Ministries. Accountants and technical staff from each regional center and district were allocated as assistants.The reception was conducted according to a special plan and schedule. All trade points were opened and medical and cultural services were provided. According to the above decree, assistance was provided to "Soviet immigrant citizens": 3,000 soms per family, and 600 soms for family members. Each family has the right to receive a loan from the state bank up to 15,000 for individual housing and 3,000 for purchase of livestock. However, these measures have not been implemented at their local level.For example, it was found out that from the 39 families of "10 years of Kazakhstan" village of Pavlodar region, two families were placed in unfinished housing and that the state farm employees did not give them money. The overwhelming majority of Chinese Kazakhs were engaged in animal husbandry in China while maintaining a nomadic lifestyle.During this period, the traditional cattle breeding, lifestyle, and language in the North of Kazakhstan were in decline. The local Kazakh society was on the verge of a huge social deformation.

Kazakhs from China were particularly upset when they witnessed the dominant position of the Russian language and culture in the North. Because they came to be busy with the animal husbandry they did. The main language of communication in the northern region was the Russian language, and it has created communicative difficulties for the Kazakh migrants.

Chinese Kazakhs were traditional part of the Kazakh community, which preserved their nomadic life and customs. The most important thing is that the opportunities for livestock farming are limited in the areas where the grain is extracted first. The migratory Kazakhs from China were in need of state support because they could not get their property out of the border.

Despite the fact that they have the privileges and benefits of government grants, many of them have been denied due to their timely failure.Local bureaucratic cases have often been complicated by the situation. For example, Consumer Co-operation could not provide the residents with the necessary household items. The store has been in sale from soap, tea, confectionery, and kerosene lamps. These things have caused a variety of household problems.

It should be noted that the settlers who came from China in the 1950s were citizens of the USSR. Therefore, the majority of them should be understood as citizens of the former Kazakhstan. They were mainly those who left the 20th century under the siege of Russia and the Soviet Socialist Republic and their descendants.Although many of them have lived up to now on the Chinese territory, they have not joined a full-fledged Chinese population yet. Representatives of the USSR in China, who used this situation, issued a consignment note or passport issued by other persons in China on the territory of China.

Kazakhs who kept the nomadic lifestyle had a bad documenting process, and the weakening of the authorities in the remote region during the tragic events in China was only possible after 1949. Nevertheless, it is impossible to document all Kazakhs who intend to move to the USSR. Moreover, when the border with the USSR was open in the USSR, many ethnic Kazakhs did not clearly define their status. Some of them went through a Chinese passport. Difficulties arose because of the fact that the local militia authorities had not been able to work with them for some time, even though they had come to the new place.Delays in these documents prevented them from borrowing money from the state to buy a livestock [7]. However, it is only a fact that these delays are incompatible with the current bureaucracy. Chinese Kazakhs (local Kazakhs or Russians called them "Chinese") went through the documentation and provided all necessary assistance within two months. They have come into contact with local Kazakhs for the next decade.

The ethnic Kazakh families who moved from the People's Republic of China in 1955 (numbers, dynamics)

Regions	Family Plans for Soviet citizens	In fact, immigrant families	Including		
			All people	including	
				worable	School ages children
Akmola	500	305	1288	446	207
Kokshetau	1000	918	3577	1377	672
Kostanai	1300	1100	4480	2064	858
Pavlodar	1200	1204	5300	1926	786
Northern Kazakhstan	-	-	-	-	-

Migrants,in Kyzyltu district of Kokshetau region, from the People's Republic of China were not asked where they would like to settle. Although there werea lot of Kazakhs in this area, they were well-versed in the Kazakhs and livestock farmers who have seen the cultural and socio-cultural background of China, and land farming was not understandable for them.

Many of them have been settled in Almaty and Taldykorgan regions, and despite the fact that they have been provided with housing and livestock, they have moved to a place where their relatives have just landed. [8] The problem is not only the relatives, but also the main reason, because of the small number of cattle in China, which had a lot of livestock keeping the former way of life. The management did not consider any kind of livestock as a livestock. He witnessed the extreme poverty in the region, and they could not see their future in this region. They also took all financial aid and immediately went to other regions. They had to intervene in the law enforcement agencies to prosecute and return. However, such events could not have been compared to those coming from the USSR in the West.

That is why the Chinese did not turn around. The mountainous regions of the Almaty region and the Taldykorgan region were favorable for livestock breeding. There were opportunities for study and education in the Kazakh language. The historic part of Kazakhstan saw psychological, emotional disturbances of the Kazakhs who emigrated from the vast expanse of Chinese, when they saw a lot of European peoples who sank into Saryarka.

The Kazakh leadership tried to move absolute majority number of ethnic Kazakhs, who settled in Kazakhstan to Northern regions. It is noteworthy that in the 1950s, the number of Kazakh families residing in Almaty and Taldykorgan regions did not exceed 200-400 families; as we have seen from the above table, thousands of families are directed to Northern regions [9].

The Moscow administration was particularly interested in the immigration of immigrants from the Western regions of the USSR. Regarding these facts, Murzakhmetov, the Executive Director of the Kyzyltu District Executive Committee, said: "It is not a matter of tactful reception of all those who should not be unnecessary, but we need people who work for us."We should send them to the areas and regions where we are raising [10]. The employee the Kazakh SSR Beysebaev asked the question of non-purposeful use of hundreds of millions of sums of money in the state farms, the problem but it was blocked by the Moscow side.

As, it says in L.Brezhnev's book "Virgin", "The developing virgin in Kazakhstan was not only a big event but also an economically profitable event [4]. However, the apologists of the idea of "developing virgin" so far have not been able to present the history of this difficult period only in a single positive direction, fully informing its humanitarian, ethnocultural, ecological, ordinary spirits and the real life of the people of the country couldn't give the definite sample.One of the main goals of our work is to explore the issues of daily life, relationships of the people, their results, which have radically changed the social-cultural, ethno-demographic structure of this "virgin land".

At the same time, while in a rare way, the policy of "Russification" of the North-Sary-Arka Region of Kazakhstan is still in need of a profound study, even though the arrival of ethnic Kazakh migrants from the People's Republic of China to the deformation of the former Kazakh land is one of the themes.Unlike the "one who works the virgin land" settlers from the western districts of the USSR, the majority of immigrants from China are notable for the fact that some of them are migrating to areas where Kazakhstan is migrating, but almost

all of them are characterized by the fact that they are citizens of Kazakhstan and have not returned to the People's Republic of China. In the period of 1954-1965 2594000 repatriates came from China to Kazakhstan, the first wave of which was marked by the development of the virgin in the northern regions of Kazakhstan. [12].The fact that the most of the repatriations are partly funded in Kazakhstan proves that this event was successful. We see that adaptation of Kazakhs from China is generally positive.

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IMMUNOPHENOTYPING AND FREQUENCY THE PREVALENCE AMONG PATIENTS CHILDREN ACUTE MYELOID LEUKEMIA

[1-2]Baratova D.A., [3-2]Mamatysaeva U.A.

[1]ANMSO "Eurasian Center of Oncohematology,Immunology and Therapy", Saint-Petersburg, e-mail: baratova@list.ru;
[2]ANO "National register of hematopoietic stem cells Kirgizia", Saint-Petersburg;
[3]SI "National Center of Oncology and Hematology" at the Ministry of Health", Bishkek

The article presents the results of immunotyping(IPT) studies using the method of flowing cytofluorimetry and determined frequency the elicitation among patients children of acute myeloid leukemia. Immunophenotyping is one of the most sensitive methods in differential diagnostics, taking into account the assessment, their exactly in detailed characteristics the dozens and hundreds of tumor (blast) cells, and allow reveals a characteristic immunophenotype, the availability of myeloperoxidase (MPO), which dictates about the need for timely selection of an effective chemotherapy program and after treatment achieving complete remission, detecting minimal residual disease. The diagnosis of acute myeloblastic leukemia can be made even, and in happening, if myeloperoxidase (MPO) is not detected, and tumor cells express other, less specific myeloid markers and is excluded the variant of acute lymphoblastic leukemia. Based on the results, immunophenotyping gives its targeted characteristic feature of tumor cells and individually with account assessment in excessive sensitivity of the method. At immunophenotyping by dint of flowing cytofluorimetry, detection among the patients children in the Kyrgyz Republic (Kirgizia), the most prevalence acute myeloblastic leukemia (variant M2) in 53% of cases and acute myelomonoblastic leukemia (variant M4) in 20% of cases, and several less acute myeloblastic leukemia (variant M1) in 10% of cases, acute promyelocytic leukemia (variant M3) in 10% of cases, acute monoblastic leukemia (variant 5a,5b) in 7% of cases. Acute myeloid leukemia is diagnosed among female patients of kirgiz nationality in 78% of cases, among males in 83% of cases, and among female patients of residents Russian-speaking population of the Kyrgyz Republic(mixed nation and different nationalities) (Kirgizia) in 22% of cases, among males in 17% of cases. The detection is more often among patients children kirgiz nationality: acute myeloblastic leukemia (variant 2) in 69% of cases, acute promyeloblastic leukemia (M3 variant) in 67% of cases, acute monoblastic leukemia (variant M5a, M5b) in 0% of cases and also in patients children of the residents Russian-speaking population of the Kyrgyz Republic (Kirgizia) in 68% of cases acute myeloblastic leukemia (variant M1), acute myeloblastic leukemia (variant M4) in 68% of cases and acute monoblastic leukemia (variant M5a, M5b) in 100% of cases. Today, with the timely diagnosis of acute myeloid leukemia and the selection of PChT, gives the best results in particular special in children, hematopoietic stem cell transplantation, in the availability of HLA-identical healthy donor or placental blood.

Keywords: immunophenotyping, flowing cytofluorimetry, acute myeloid leukemia, children's, kirgiz nationality

Acute leukemia – is acute malignant disease of the blood system, with defeats at the level of deterministic genus-parent stem cells or early cellular predecessor, characterized by the availability of blast cells in the bone marrow puncture or in peripheral blood from 20% and more.[4].

Today, at the diagnosis of acute myeloid leukemia by dint of flowing cytofluorimetry, it is necessary to appreciate the immunophenotypic features of tumor (blast) cells and define the directionality of myeloid cell linearity and important exclude T and B -linear or rare variants of unclear linearity [3].

Cells of the myeloid linearity develop in the bone marrow from a general hematopoietic predecessor. The early cells monocytic series – are monoblasts and promonocytes. In norm their content in the bone marrow is utterly low.

By description to the author [7], monoblasts express markers of the predecessors CD34, CD117 and HLA-DR, the appear in the sequence CD4, CD64, CD36, CD33, CD11c, CD11b, CD15, CD14, and in stage promonocyte the intensity expression of these given markers increases, and antigens of the early stage of differentiation (CD34, CD117) slowly disappear.

At the diagnosis of acute myeloid leukemia (AML), the most specific is the elicitation of myeloperoxidase (MPO) in the cytoplasm of tumor cells.

Myeloperoxidase-is a linear-specific marker of the myeloid line, a lysosomal enzyme granulocytes.

In immunophenotyping in the case of not detecting myeloperoxidase, that for establish the myeloid variant of acute leukemia, it is necessary to explore other myeloid antigens, including markers of rare forms of AML (erythroid, megakaryoblastic). With the diagnostic purposes the definition of the linear accessories of tumor cells uses sets of antibodies, recommended by an international group of experts [6], and for differential diagnosis, is using classifications the EGIL[5] and of the World Health Organization (WHO) [9].

For confirm the myeloid directionality of tumor (blast)cells, it is necessary to appreciate the expression of myeloid antigens.

By view to the authors [9], in acute myeloid leukemia (AML) blast cells most often

express predecessor markers (CD34, CD117, HLA-DR) and in rare happening terminal deoxynucleotiddyl transferase (TdT), specialized DNK-polymerase, which in norm subjoin N-nucleotides at rearranging the T and B genes of cell receptors, increasing their variability.

At the acute myeloid leukemia marker CD7 detection in 30 % of cases, the expression of this antigen may correlate with not favorable prognosis.[8].

At making a diagnosis of myeloid option of linearity and correct selection of PChT, it is necessary to conduct allogeneic transplantation of hematopoietic stem cells. Timely conduct of a high-technology method of therapy, closely related, unrelated bone marrow transplantation, allows at the availability HLA – identical healthy donor [2], or placental blood.[1].

The aim of our study is to elicitation frequency the prevalence and timely diagnostic analysis of the immunophenotype of tumor (blast) cell linearity in acute myeloid leukemia in patients children in the Kyrgyz Republic(Kirgizia).

Materials and research methods

The group of research from November 2016 to December 2018 included 30 patients of children (female-16,male-14)with acute myeloid leukemia, of them patients children of kirgiz nationality-24 (female-14 and male-10) and residents of the Russian-speaking population of the Kyrgyz Republic (mixed nation and different nationalities) – 6 patients of children, of them ((female – 2, and male – 4), all citizens of the Kyrgyz Republic (Kirgizia), aged from 1.5 years to 16 years, who were examined at the Department of Pediatric Oncology of the National Center Oncology and Hematology Department of Health of the Kyrgyz Republic (Kirgizia) and in the Department of Pediatric Hematology Osh interregional clinical children's hospital in Osh, in St. Petersburg consult doctor-hematologists Eurasian Center of Oncohematology, Immunology and Therapy.

Method immunophenotyping by dint of flowing cytofluorimetry conducted the first time and research immunophenotyping was conducted in Bishkek, Kyrgyz Republic(Kirgizia).[3].

Method by dint of flowing cytofluorimetry

The material for the study is the bone marrow. Patients made puncture of the sternum. For obtain a qualitative result, the obtained analysis should not be with impurity blood and not destroy the cells during the test-sample preparation to immunophenotyping. Immunophenotyping of leukemia (blast) cells performed on a flow cytofluometer Cytomics FC500 (Beckman Coulter, USA) using monoclonal antibodies Beckman Coulter.

Statistical processing of the results included the analysis of standard criteria X2-square, which was used to assess the significance of differences in the occurrence of certain characteristics between the control group and the test group. Determination of the "p", the corresponding value found. X2-square performed considering one degree of freedom.

All mathematical calculations and statistical analysis of the overall study was performed using a personal computer using the package application programs for spreadsheets – Microsoft – Excel M version 7.0, for Windows 95, for Windows-based 2010, Statistica-5.

Research results and discussion

During our research, the diagnosis of acute myeloid leukemia was established on the basis of clinical data and a complex series of general and special laboratory-diagnostic indicators.

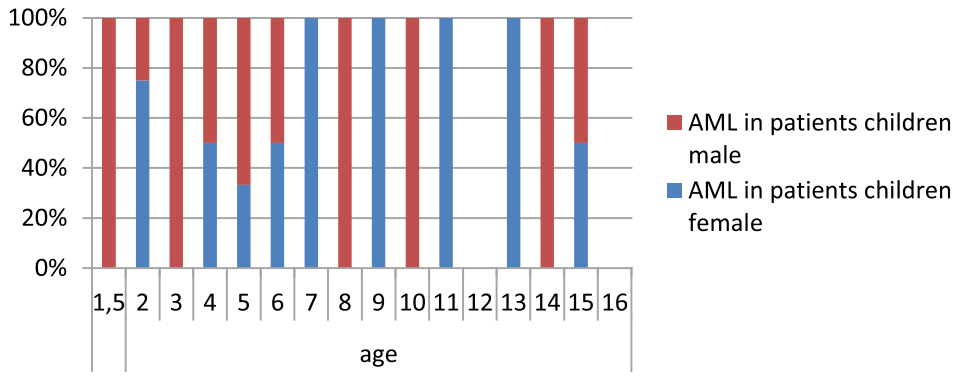

Fig. 1.Comparative age characteristics of the frequency of elicitation in the Kyrgyz Republic (Kirgizia) among patient's children female and male with acute myeloid leukemia

By the results of our research as it is seen of the present in the Figure 1, in Kyrgyz Republic (Kirgizia) acute myeloid leukemia among patients children male at 1,5 years, 3 years, 8 years, 10 years and 14 years, and among patients female in 7 years, 9 years, 11 years and 13 years at these ages practically detection in 100 % of cases.

The detected among patients children females in the age of 2 years is detected among females in 77 % of cases, in 4 years in 50 % of cases, in 5 years in 32 % of cases, in 6 years in 50 % of cases and in 15 years in 50 % of cases and among patients children male at the age of 2 years in 23 % of cases, in 4 years in 50 % of cases, in 5 years in 68 % of cases, in 6 years in 50 % of cases, in 15 years in 50 % of cases.

At the our observation in the age of 12 years and 16 years, not elicitation among nor females, nor among males – 0 % of cases.

By the frequency prevalence among patients children kirgiz nationality is detected acute myeloblastic leukemia (variant M1) in 32 % of cases, acute myeloblastic leukemia (variant 2) in 69 % of cases, acute promyeloblastic leukemia(variant M3) in 67 % of cases, acute myeloblastic leukemia (variant M4) in 32 % of cases, acute monoblastic leukemia (variant M5a, M5b) in 0 % of cases, data are presented in Fig. 2.

In the compared among the patients children of residents of the Russian-speaking population of the Kyrgyz Republic (mixed nation and different nationalities)(Kirgizia), acute myeloblastic leukemia (variant M1) is detected in 68 % of cases, acute myeloblastic leukemia (variant 2) in 31 % of cases, acute promyeloblastic leukemia(variant M3) in 33 % of cases, acute myeloblastic leukemia (variant M4) in 68 % of cases, acute monoblastic leukemia (variant M5a, M5b) in 100 % of cases.

By of significance acute myeloblastic leukemia (variant M1), acute myeloblastic leukemia (variant M4), acute monoblastic leukemia (variant M5a, M5b), have statistically highly authentic differences, where, $p < 0.0001$.

As can be seen from the presented Fig. 3, acute myeloid leukemia in female patients children of kirgiz nationality the elicitation in 78 % of cases, and among male patients in 83 % of cases.

And among patients children female of residents of the Russian-speaking population of the Kyrgyz Republic (Kirgizia) are detected in 22 % of cases, among males in 17 % of cases.

As can be seen from Fig. 4, is elicitation among the patients children of the Kyrgyz Republic, the most of the prevalence acute myeloblastic leukemia (M2 variant) in 53 % of cases, acute myelomonoblastic leukemia (M4 variant) in 20 % of cases and a little less spread acute promyelocytic leukemia (M3 variant) in 10 % of cases, acute myeloblastic leukemia (M1 variant) in 10 % of cases, acute monoblastic leukemia (5a,5b variant) in 7 % of cases.

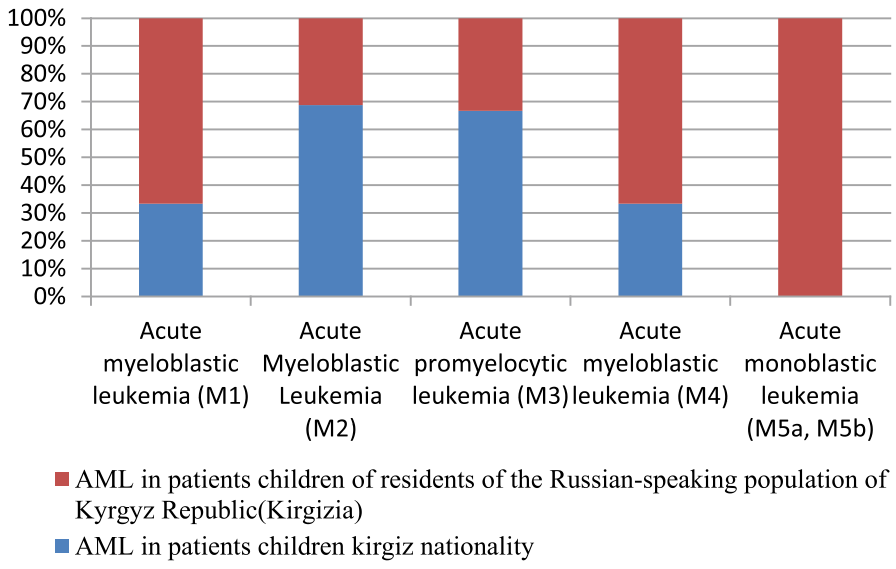

Fig. 2. Variants of acute myeloid leukemia and the frequency of the prevalence among the patients children of kirgiz nationality and of the residents Russian-speaking population of the Kyrgyz Republic (Kirgizia)

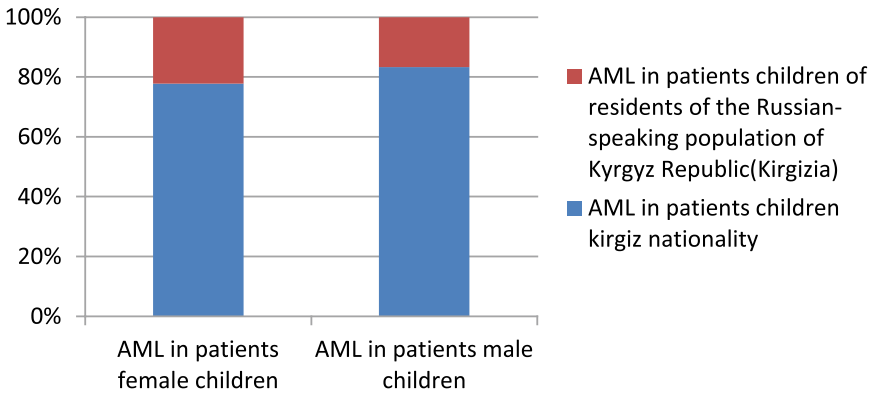

Fig. 3. Prevalence among female and male patients children of acute myeloid leukemia in the Kyrgyz Republic (Kirgizia)

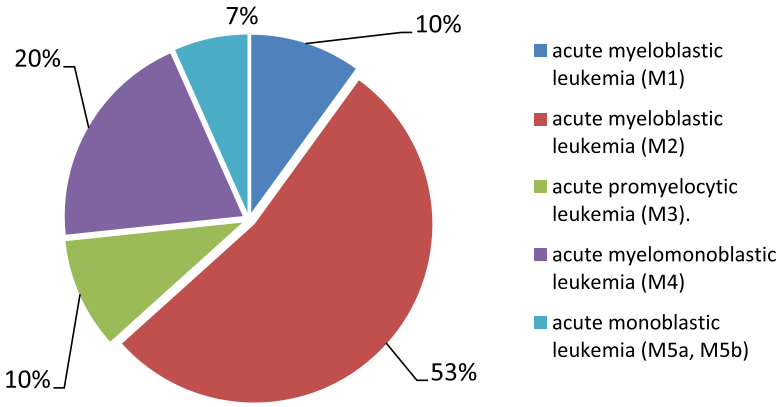

Fig. 4.The frequency of the prevalence in the Kyrgyz Republic among the patients children immunological option of acute myeloid leukemia

Thus, for determine the variant of linearity and elicitation frequency of prevalence, and the feature of the flow of acute myeloid leukemia in patient's children in the Kyrgyz Republic, it is necessary conduct research by dint of flowing cytofluorimetry.

At the acute myeloid leukemia, despite in studying the detailed characteristics of tumor (blast) cells, which allows detection to the characteristic immunophenotype by dint of flowing cytofluorimetry, for reaffirm the diagnosis, it is necessary to conduct in parallel cytogenetic, molecular-genetic and morphological studies.

In the frequency of the prevalence acute myeloid leukemia detection and among male and female, and the flow of the disease more aggressive, which is necessary after installation the diagnosis and determination the directing of myeloid linearity, timely selection of polychemotherapy and transplantation of hematopoietic stem cells, at the availability of HLA-identical healthy donor or placental blood.

Conclusion

1. Research bone marrow in patients children with acute myeloid leukemia method by dint of flowing cytofluorimetry

2. Screening study for determine the linear directing of tumor cells.

3. Study tumor cells and determine the direction of myeloid linearity and exclude lymphoid linearity.

4. In parallel conducted cytogenetic, cytochemical, molecular-genetic, morphological studies.

5. Immunophenotyping by dint of flowing cytofluorimetry makes it possible to elicitation the characteristic myeloid linear immunophenotype of tumor (blast) cell and timely selects effective program chemotherapy.

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THE EFFECT OF WEATHER FACTORS ON THE CERTAINABILITY OF THE RESIDENTS OF BISHKEK AND OSH ON HEART DISEASES

Belov G.V., Umurzakova G.I., Pirmatova A.K., Munir Ali Mirza

Osh State University, Osh, e-mail: gumurzakova93@mail.ru

The purpose of the work is to compare the effect of air temperature, atmospheric pressure, precipitation, abrupt weather changes on the number of ambulance calls to patients with cardiovascular diseases. Bishkek, Osh. Material and methods. The data of calls to the ambulance station of Bishkek, Osh were analyzed by disease classes in accordance with ICD-10 revision: A00-R99 – for all reasons; I00-I99 – diseases of the circulatory system. The study included more than 500 thousand ambulance calls. To assess the meteorological indicators, the archive data of the site http://www.gismeteo.ru/diary/5327 was used. Correlation analysis was performed using the SPSS program. The results indicate the existence of significant moderate and strong links to the circulation of patients with cardiac and cerebrovascular diseases with periods of prolonged heat, days with a sharp change in weather, days with an increase in atmospheric pressure after the invasion of the cold air front and precipitation. The need for seasonal prophylaxis of metapathic reactions with regard to weather changes is shown.

Keywords: weather, morbidity, heart disease, meteopathic reactions, Fergana Valley, Chui Valley, correlation analysis

Global climate change is not only warming. The absolute temperature increase over a hundred years was only 0.8 °C. This is not noticeable to humans. But such a change in temperature leads to powerful changes in air flow and sea currents. The weather is becoming very changeable. The number of abrupt weather changes.

It has long been a known fact that colds are growing, exacerbation of rheumatic diseases, respiratory diseases, and the urogenital system in cold and freezing temperatures. A 1-degree decrease in temperature in Europe accounts for a more substantial increase in morbidity and mortality than with a 1-degree increase in temperature [10]. However, in summer, when there is a strong heat in a certain risk group: post-infarction, post-stroke patients, hypertensive patients, elderly people, in general, develop meteopathic reactions [1, 3]. In this case, the temperature change does not occur by itself, but as a result of changes in atmospheric pressure, wind intrusions, which also leads to meteopathic reactions other than the listed patients in hypotension, asthmatics, and patients with COPD [6].

Identifying typical and individual human reactions to weather changes is not an end in itself; there are opportunities for seasonal and current weather prophylaxis of important non-communicable diseases, but it must be targeted, cost-effective [5, 7, 8].

Kyrgyzstan is a mountainous country with 4 climatic and geographical zones. Previously, studies were conducted on the impact of climate change on public health on the example of the Chui Valley and the city of Bishkek [2, 3].

The purpose of the work is to determine the influence of weather factors on the incidence of Bishkek and Osh residents over a twenty-year period.

Materials and research methods

In assessing the incidence rates of the population, data from the Republican Medical Information Center of the Ministry of Health of the Kyrgyz Republic (RMIC of the Ministry of Health), calls to the Bishkek Emergency Medical Station of Osh for individual classes of diseases were used in accordance with ICD-10 revision: A00-R99 – from all causes; I00-I99 – diseases of the circulatory system. The study included more than 450 thousand ambulance calls.

The analysis was carried out by age categories, sex and classes of diseases. To assess the meteorological indicators, the archive data of Kyrgyzhydromet and the site http://www.gismeteo.ru/diary/5327 were used. The data were estimated in dynamics (daily, monthly and annual average). Correlation and regression analysis of medical and meteorological indicators was performed using the SPSS program (version 20.0.1).

Research results and discussion

The cities of Bishkek and Osh are the largest cities of Kyrgyzstan. They are located approximately at the same height of 750-850 m above sea level. Bishkek is located in the Chuy valley, Osh – in the Fergana valley, both valleys are closed from the North, East and South by mountains, and open to the west. Bishkek is located at 43 °north latitude, and Osh – 41o. Social conditions in these cities are similar. There is a general system of organization of health care. That is, with a lot of consideration, they significantly differ in one climatic factor – air temperature. In Bishkek, the long-term winter air temperature is -5.0 °C, and the summer temperature is +24.4 °C. In Osh, respectively, -2.8 °C and +25.7 °C.

Correlation analysis showed that for the residents of Bishkek and Osh, there are significant links between air temperature, atmospheric pressure and precipitation, and morbidity and mortality from cardiovascular diseases (Fig. 1).

Moderate connections are common to all ages and any gender in general, but stronger connections are found for older women. It can be seen from the figure that there is a direct correlation of average power between the indices of appealability for emergency care of the population in the class of heart diseases in the age group of 65-74 years and data on atmospheric pressure and the amount of precipitation. In relation to temperature, an inverse relationship is established between the average force.

Here a paradox is revealed: on the one hand, the greatest number of calls is detected in July, on the other hand, with a temperature increase from -10 to +30 °C, as the correlation analysis shows, the frequency of calls in general decreases for all natural reasons. In our opinion, this is explained by the fact that the entire data set is processed for the whole year, when for 9 months the temperature rises from minus to comfortable or again decreases to minus. Whereas a hot daily temperature of + 30 °C and higher costs several days in June, more often in July, August, and sometimes in early September. These periods of heat and cause meteopathic reactions in infants, old people, meteo-labile patients.

We also identified days with hot temperatures and abrupt weather changes (fluctuations in average daily temperature by 5 or more degrees C compared with the previous day).

The results of the study show that with a slight increase in average annual, average monthly temperatures for the period studied, there are significant shifts in peak indicators of maximum daily temperature, which were not previously addressed (table 1).

The table shows that in Bishkek, there is a tendency for the number of hot days to increase by 36.7%: from 46.3 per year in 1998-2001, with a certain decline – in 2002-2005, to 63.3 c year in the period -2011-2014, and 64.1 in the period 2015-2018.

For the city of Osh, for a sixteen-year period, there was a continuous increase in the rate of 45.1%: from 52.6 to 77.2 days a year.

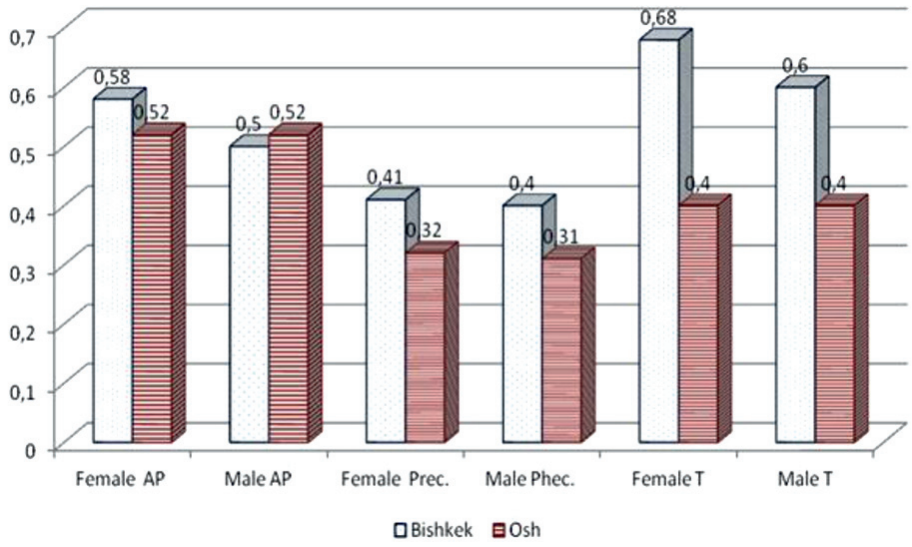

Fig. 1. Correlation coefficients between the population turnover rates of Bishkek and Osh for heart disease in old age (65-74 years) and data on atmospheric pressure, temperature and precipitation

Table 1

Number of hot days in the cities of Bishkek and Osh for the last 20 years (in four-year dynamics).

City	1998-2001	2002-2005	2006-2010	2011-2014	2015-2018
Bishkek	46,3	44,2	60	63,3	64,1
Osh	52,6	54,75	61,0	76,0	77,2

Table 2

Distribution of hot days per year by the cities of Bishkek and Osh in 2011-2018

City	april	may	june	july	august	september	october
Bishkek	0,25	2,0	12,25	21,0	20,25	6,5	1,0
Osh	0,75	5,75	13,25	23,75	23,75	8,0	0,25

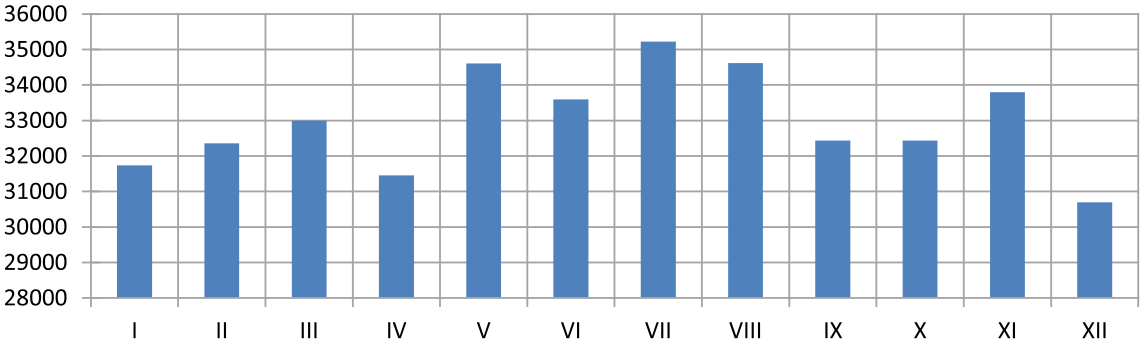

Fig. 2. Monthly structure of ambulance calls in the city of Bishkek in 2007-2014

Table 3

Monthly structure of ambulance calls in the city of Osh, in general, and about hypertension (H), including those that ended lethal before the ambulance arrived.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Total	6729	5024	6004	6303	6543	6374	6267	12441	5614	5205	5003	5457
H	1117	991	1112	1146	1027	819	669	1406	718	853	891	937
Death before arrival	63	50	41	46	56	44	32	81	32	36	45	48

N o t e : R o m a n numerals indicate the serial numbers of the months of the year.

Hot days are most frequent in July and August (Table 2), which must be taken into account when organizing seasonal weather prophylaxis.

It should be noted that the peak of ambulance calls in the city of Bishkek also falls on the month of July-August (Fig. 2). Also, a high number of calls occur in March and November, when the highest frequency of abrupt weather changes in the Chui Valley is observed.

Interestingly, the death rate from diseases of the cardiovascular system has increased over the past 10 years in Kyrgyzstan by 19.25%, including in the northern region by 22.6%, and in the southern region by 18.5%. In general, in the southern region, mortality from cardiovascular diseases is significantly lower (43.5 per 10 thousand people) than in the northern region (54.8 per 10 thousand people). With equal ethnic and social components, this suggests a certain role for climatic and geographical factors.

For example, 2014, when in the city of Osh, the temperature above +30 °C was kept 28 of the 31 days of August. It is interesting that the peak of ambulance calls in general and about hypertension also fell in August (Table 3).

Also, at the peak of the heat, death before the arrival of the ambulance was more than twice as high as during the other spring, summer and autumn months. Obviously, it is necessary to establish seasonal prophylaxis of cardiac and cerebral-vascular diseases during periods of prolonged heat.

Interestingly, in some other years, call peaks fell during the winter months. Therefore, meteorological prophylaxis should be targeted and associated with specific weather conditions in the current year, which is consistent with the data of other authors [4, 9].

Table 4

Number of days with a sharp change of weather in the cities of Bishkek and Osh for the last 20 years (in four-year dynamics)

City	1998-2001	2002-2005	2006-2010	2011-2014	2015-2018
Bishkek	93	90,75	92,7	91,25	94,3
Osh	44,3	36,6	38	46,7	54,2

Table 5

The number of days with a sharp change of weather in the cities of Bishkek and Osh 2011-2018

City	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Bishkek	9	7,8	12,4	10,4	4,6	5,6	3,5	3,8	5,8	7,0	10,4	10,4
Osh	2	3,75	6,25	5,75	4,0	3,75	2,5	2,75	2,5	6	3,25	3,75

Note: Roman numerals indicate the serial numbers of the months of the year.

It is known that the adaptive capabilities of the body get off with a sharp change in the weather. In the Chui and Fergana valleys, warm weather with reduced atmospheric pressure and partial oxygen pressure faces an invasion from the West of cold air fronts. During the invasion of the cold wind, the atmospheric pressure quickly (in a few hours) increases, often with precipitation. We compared the number of abrupt weather changes in Bishkek and Osh (Table 4). It turns out that Osh is characterized by more stable weather. The number of abrupt weather changes in Osh is 51.1-59.7% less than in the city of Bishkek. However, their number in recent years has increased by 22.3% compared with 1998.

The most unstable years in the city of Bishkek were 1999 and 2002, the most quiet – in 2005. In 1999, there were 107 abrupt changes in the weather.

During the year, the most unstable weather in the city of Bishkek is characteristic for March, April and November (Table 5). During these months, it is necessary to conduct seasonal weather prophylaxis in meteo-dependent patients.

In the city of Osh, there are no months with a high number of days with abrupt changes in the weather, such as in Bishkek (10 or more). Residents easier to adapt to the current temperature. Seasonal weather prevention there will initially be less effective.

Correlation analysis revealed for the cities of Bishkek and Osh in the days of abrupt weather changes (according to the data of 2012-2018) an increase in mortality from cardiovascular and cerebrovascular diseases in general for the whole population (reliable positive moderate connections: r = + 54-62). In the group of persons over 75 years of age, the association of days with a sharp change of weather and mortality has reliable positive strengths r = +71.

Here we must take into account that Osh residents have long adapted to a higher temperature: clothing, food, housing, work and rest with them were initially more Asian than those of Bishkek residents, whose lifestyle is more European.

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MISCARRIAGE: PREDICTIVE SIGNIFICANCE OF FOLATE CYCLE GENE POLYMORPHISM

Kushubekova A.K. Samigullina A.E.

NCMCW MH KR "National Center for Maternal and Child Welfare of the Ministry of Health of the Kyrgyz Republic", Bishkek, e-mail: samigullina.68@mail.ru

Considering the high medical and social significance of miscarriage for country's gene pool preservation, the research devoted to studying the new high-tech diagnostic approaches aimed at early, pre-symptomatic identification of high-risk married couples are growing more urgent for practical health care. This research has examined the predictive significance of nucleoid transitions in the folate cycle genes in women with miscarriage in history and their role inparticular gestation pathologic behavior.In the period from 2015–2017 theclinical observation of 127 pregnant women was performed on the basis of NCMCW, of which: 74 women with miscarriage in history and 53 conditionally healthy women in the control group. During this observation it was found the following: the nucleoid pattern in the women with miscarriage differs from the control group, $p < 0.001$. Homozygous nucleoid transition is more often detected in the treatment group compared to the control group, $p < 0.001$. Heterogeneous gene transitions occurmost often in women with miscarriage, $p < 0.001$. The homozygous nucleoid transition is characterized by a threefold reproductive loss, which is the worst case of gene carriage, and is important in miscarriage. Critical terms of pregnancy termination for homozygous transitions was the period of up to 12 weeks, for heterozygous – 13-21 weeks, $p < 0.001$.Hyperhomocysteinemia was found statistically significantly more often in the homozygous transition group in comparison with another gene pattern, $p < 0.001$. The aggravated obstetric history was detected in 58.1 % of women with miscarriage, in the homozygous transition group, $p < 0.001$. The worst situation was found in women with homozygous nucleoid transitions and in the number of gestation complications compared with other groups, $p < 0.001$. The analysis of various nucleoid transitions in folate cycle genes has enabled to identify the important role of genetic predisposition in predicting miscarriage.

Keywords: pregnant women, miscarriage, folate cycle, polymorphism, nucleoids, hyperhomocysteinemia, Kyrgyz Republic

The medical and social significance of miscarriage and its effect on the perinatal morbidity and mortality rates, as well as on the reproductive health of women places scientific and clinical research in this area among the most important objectives of modern medicine [1].

The analysis of miscarriage incidence in the Kyrgyz Republic has revealed a high level of reproductive loss, especially in terms of 6–12 and 28-36^{+6} weeks of gestation, which requires further work to identify risk factors and to develop predictive measures of great relevance and applied significance across the country [2].

Over the years the relationship between low dietary folate intake, hyperhomocysteinemia in pregnant women and the risk of obstetric and perinatal complications has been actively studied all over the world. In this regard, is the issue on the involvement of the folate metabolism genepolymorphisms, folate deficiency and hyperhomocysteinemia caused by it to the miscarriage, fetoplacental insufficiency, preeclampsia, premature birth, intrauterinegrowth restriction and congenital malformationformation isof particular interest [3].

The inevitable miscarriage causes are so varied that, until now, the creation of single classification is difficult. The issue on the beginning and scope of spousesurvey is widely debated in the literature. It is generally accepted abroad that a detailed examination should be started after three repeated miscarriages, in the Russian obstetrics it is recommended after two, but more and more scientists have noted the need to examine spouses even after one miscarriage.According to modern concepts, the miscarriage problem cannot be solved only during pregnancy. To ascertain any miscarriages causes and to assess the state of spouses' reproductive system it is necessary to conduct comprehensive examination outside the state of pregnancy. The development of new high-tech diagnostic approaches aimed at the early, pre-symptomatic identification of high-risk married couples for miscarriageisof particular importance [4].

Considering the insufficient study of this issue in the Kyrgyz Republic, the study of significance of the genetic factor as a predictor of reproductive loss in women with miscarriage for modern obstetrics is of great scientific interest.

The goal of research is to study the predictive significance of nucleoid transitions in folate cycle genes during miscarriage.

Materials and research methods

Over the 2015to 2017period a cohort prospective study was conducted on the basis of the National Center for Maternal and Child Welfare (NCMCW) of the Ministry of Health of the Kyrgyz Republic.

The study involved 127 pregnant women, of them: the treatment group consisted of 74 women with miscarriage in history and the control group – 53 conditionally healthy women.

Table 1

Sample number (n)

Treatmentgroup, n = 74			Controlgroup,n = 53		
"-/-"	"-/+"	"+/+"	"-/-"	"-/+"	"+/+"
n = 9	n = 44	n = 21	n = 39	n = 12	n = 2

Table 2

Folate cycle gene characteristics

Abbreviation	Locus	Protein product	Polymorphism
MTHFR	1p36.3	Methylenetetrahydrofolatereductase	C677T (A222V)
			A1298C (E429A)
MTR	1q43	Methioninesynthetase	A2756G(D919G)
MTRR	5p15.3-15.2	Methioninesynthasereductase	A66G(I22M)

Table 3

Abbreviated notation of nucleoid pattern carriage in MTHFR, MTR and MTRR genes

Abbreviation	Polymorphism	Genotypes	Abbreviatednotation
MTHFR	C677T(A222V)	C/C	"-/-"
		C/T	"-/+"
		T/T	"+/+"
	A198C (E429A)	A/A	"-/-"
		A/C	"-/+"
		C/C	"+/+"
MTR	A2756G(D919G)	A/A	"-/-"
		A/ G	"-/+"
		G /G	"+/+"
MTRR	A66G(I22M)	A/A	"-/-"
		A/ G	"-/+"
		G /G	"+/+"

Depending on the nucleoid pattern carriage in folate cycle genes, pregnant women were divided into subgroups (Table 1).

The average age of women of the treatment group was 29.9 ± 2.5 per 100 examined, control groups – 29.1 ± 2.5, respectively, the groups were comparable, no statistically significant difference was found in groups, $p > 0.005$.

To identify the significance of gene polymorphism in women with reproductive losses, the folate cycle gene examination was conducted (Table 2): three folic acid metabolism genes, MTHFR, MTR and MTRR, associated with hyperhomocysteinemia and folivododeficiency states were examined.

The nucleoid pattern inMTHFR, MTR and MTRR genes were determined by the PCR method (allele-specific polymerase chain reaction) with result detection in real time.

Table 3 provides the information on abbreviated notationsof detected nucleoid patterncarriage.

The required sample number was calculated according toE.N. Shigan (1987) ($t = 3.2$, $P < 0.001$, 99.9%) [5].

Calculations of relative values (P) and their errors (mp) have been made. To estimate the relative ratio numerical value difference confidence the calculation of confidence criterion (confidence coefficient, Student's t-test and χ^2) recommended by N.E. Chernova has been made (2006) when conducting medical and social research using the formula $t = \frac{P2 - P1}{mrazn} t$, under $t = 3.2$ the differenceprobability is 99.9% or the difference confidence is < 0.001 [5]. The error significance criteria were selected as error-free prediction probability values – less

than 5% bilateral ($p < 0.05$), with 95% confidence interval and statistical power – 80% power. The rank significance was estimated by the Spearman rank correlation ratio under the formula:

$$p = 1 - \frac{\Sigma 6d^2 + A + B}{n^3 - n}.$$

To carry out statistical processing of obtained data, the online free software package of the U.S. Center for Disease Control OpenEpi 3.03 has been used.

The authors declare no conflict of interest in the Article.

Research results and discussion

It was in research revealing that the polymorphism of nucleoids in MTHFR gene in position 677 of folate cycle prevailed in the group of women with miscarriage (main group, n = 74); table 1 presents data as a triangle with a narrow base shifted toward heterozygous transition (C / T), for healthy women (control group, n = 53) – the data are presented in a form of triangle with narrow base, which emphasizes the absence of mutations in a larger number of examined patients, $p < 0.001$. However, the nucleoidtransition by heterozygous type has been revealed in 22.6 ± 5.8 per 100 examined women in the control group.

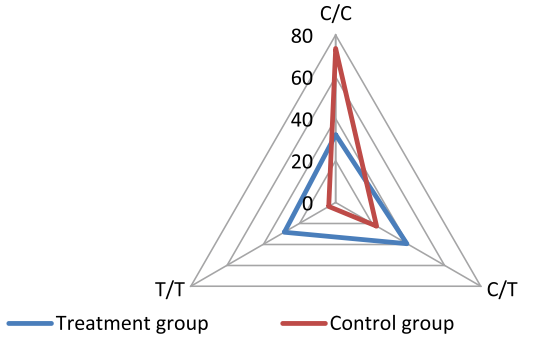

Fig. 1. MTHFRgene polymorphism in the position 677 of folate cycle

Fig. 2 presents the data of MTHFR folate cycle polymorphism in the position 1298, and the larger number of women with the nucleoid pattern inherent in this position (A / A – 75.5 ± 5.9 per 100 women) were revealedin the control group; triangle is represented by a narrow base with a broad base; for the treatment group the data look like as the triangle with a broad base, elongated towards homozygous mutation (C / C – 41.9 ± 5.7 per 100 women), $p < 0.001$.

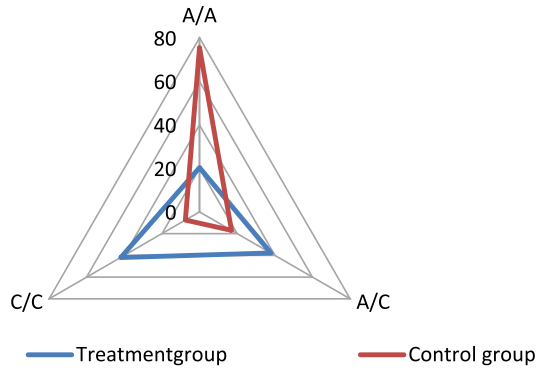

Fig. 2. MTHFR gene polymorphism in the position 1298 of folate cycle

For the MTR folate cycle in the position 2756 in the control group, the nucleoid pattern A / A revealed in 79.3 ± 5.6 per 100 women is also statistically significantly more frequent, and the data are presented as a triangle elongated upwards (Fig. 3), this pattern in the treatment group was detected only in 27.0 ± 5.2 per 100 women, $p < 0.001$. According to the treatment group data, the triangle is represented as a broad base with prevailed G / G mutation (37.8 ± 5.6 per 100 women examined), which is statistically significantly more frequent in the control group (7.6 ± 3.6 respectively), $p = 0.003$.

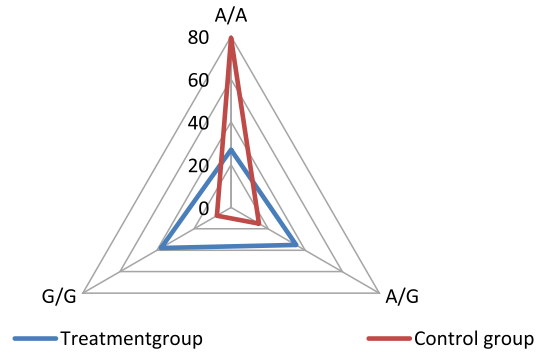

Fig. 3. MTHFR gene polymorphism in the position 2756of folate cycle

The similar pattern has been also detected for MTRR gene in the position 66 of folate cycle (Fig. 4), and the triangle with a narrow base and an elongated vertex is inherent in the control group, where nucleoids in 83.0 ± 5.2 women per 100 women are represented by the A / A pattern, which is statistically significantly more often than the treatment group (12.2 ± 3.8, respectively), $p < 0.001$. For the

treatment group, the data demonstrate the triangle with elongated base towards homozygous G / G transition, which is statistically significantly more often in the group of women with miscarriage (treatment group – 51.4 ± 5.8 per 100 examined women) than in the control group (5.7 ± 3.2 respectively), $p < 0.001$.

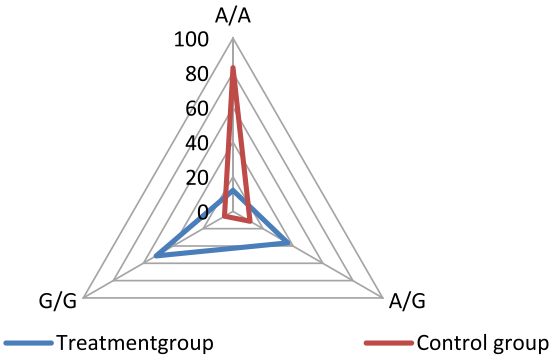

Fig. 4. MTHFR gene polymorphism in the position 66of folate cycle

The data of folate cycle gene nucleoid pattern in the women of comparison groups are presented more clearlyin Fig. 5. The graphic in the women of control group looks like a star, the rays of which are represented in more than 80% of women with the inherent nucleoid patternfor this gene. Mutated genes have been detected in every 5th woman and are presented in various combinations. For the treatment group, the graphic looks like a square with elongated angle in the MTRR gene of G / G transition mutation.

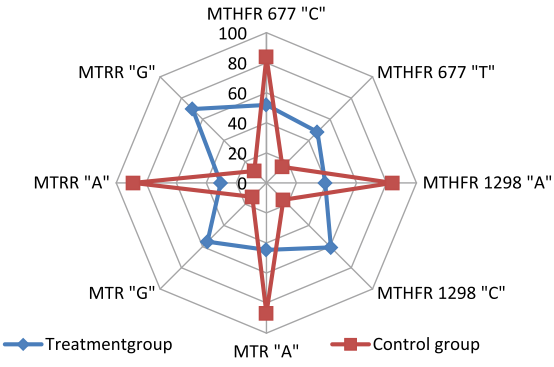

Fig. 5. Combinationoffolate cycle polymorphic genemodels in women DNA

The obtained data enable us to distinguish thefolate cycle gene nucleoid transitions in significant risk factors for miscarriage, especially if these mutations were homozygous. Considering the large importance of folate cycle in cell division of developing embryo, it is necessary to detect timely this risk factor and to level its action by taking folic acid, and, if necessary, by folates at the planning pregnancy stage of women at risk.

Further, the study has examined the significance of various modifications of folate cycle gene models depending on the presence or absence of homozygous and heterozygous transitions into them (Table 4). The average age of women with miscarriage was 29.9 ± 2.5 per 100 women examined.

Comparing reproductive losses depending on the genotype model, we have identified three different groups: "- / -" – homozygous normal genotype (9 women), "- / +" – heterozygous gene transition (44 women) and "+ / +" – homozygous gene transition (21 women). The most numerous group had various heterozygous combinations of nucleoid transition in the folate cycle genes – 59.5 ± 5.7 per 100 women, which is statistically significantly more compared to the group "- / -" with homozygous genotype without nucleoid transitions (12.2 ± 3.8 per 100 women), $t = 6.9$, $p < 0.001$, and than in the group with homozygous nucleoid transition (28.3 ± 5.2, respectively), $t = 4.0$, $p < 0.001$. In addition, it should be noted that every fifth woman with miscarriage has shown the homozygous transition "+ / +", which is statistically significantly more frequent than "- / -" – homozygous normal genotype, $t = 2.5$, $p = 0.01$.

Describing the women with homozygous normal pattern of folate cycle genes, it should be noted that in 100% of cases there was a single reproductive loss in history, the statistically significant difference with the group of heterozygous transitions $p = 0.01$.

The single fetal loss was recorded in 29.6% of women in the group of women with heterozygous nucleoid transition, and double reproductive losseswere recorded in70.5%, and the statistically significant difference in losses was revealed, $p < 0.001$. Thus, the transitions of nucleoids of heterozygous type are predictors of miscarriage; obtained data indicate the need to include women with this transition in the risk group of miscarriage.

It follows on the obtained data that the worst is the group with homozygous transition of nucleoids. In 100% of cases in such women there is fetal loss in three or more pregnancies in succession, while this pathology has not been detected in the first two groups.

Considering the stages of pregnancy at reproductive losses in the group of women with the homozygous model "- / -" of standard nucleoid pattern, the rank places are presented in decreasing form as follows: up to 12 weeks (44.4%), 13-21 weeks (22.2%) 22-31 weeks (22.2%) and 32 weeks or more (11.2%).

The rank places in the group with heterozygous nucleoid pattern "- / +" are presented in a different way, in decreasing order: 13-21 weeks (72.7%), up to 12 weeks (20.4%), 22-31 weeks (4.6%) and 32 weeks or more (2.3%).

For the group with homozygous nucleoid transition "+ / +", the rank places are presented as follows: 13-21 weeks (66.7%), up to 12 weeks (19.1%) and 22-31 weeks (14.3%), this group of the pregnancy stages in this group were interrupted up to 32 weeks.

The pregnancy was interrupted statistically significantly less often in the stages of 13-21 weeks in the group with the normal nucleoid pattern "- / -" in comparison with the group of heterozygous aberrations "- / +" ($p < 0.01$) and homozygous transitions "+ / +" < 0.05).

The obtained data enable us to distinguish the critical stages of pregnancy termination – 13-21 weeks typical for folate cycle polymorphic genes.

Further, during the study we have examined the gestation course features in women with miscarriage in history (Table 5); as mentioned above, the average age of women in the treatment group was 29.9 ± 2.5 years and of the control group 29.1 ± 2. 5 years, no statistically significant difference was found in groups, $p > 0.05$; groups are comparable.

Hyperhomocysteinemia was detected in 36 women (48.6%) of the group and 2 (3.8%) women of the control group, $p < 0.001$. Hyperhomocysteinemiain the treatment group was statistically significantly more frequent in thegroup "+ / +" – in 85.7% of women as compared to thegroup "- / +"– 36.4% of cases, $t = 4.7$, $p < 0,001$ andgroup "-/-" – 22,2%, $t = 4,0$, $p < 0,001$. Hyperhomocysteinemia in the treatment group was also statistically significantly more frequent in thegroup "+ / +" – 50.0% of cases as compared to the group "- / +" – 8.3%, $p < 0.001$, and in the group "- / -" this pathology was not registered.

The aggravated obstetric history has been revealed in 43 (58.1%) women, while reproductive losses were not included in theburdened obstetric history; this ratio has not been registered in the control group. In the treatment group in 100.0% of cases, it was aggravated in the women of thegroup "+ / +", which is statistically significantly more frequent than thewomen of the group "- / -" (33.3%), $t = 4.3$, $p < 0.001$ and the group "- / + "(43.2%), $t = 7.6$, $p < 0.001$.

The somatic pathology was detected in 44 women (59.5%) of the treatment group and in 22 women (41.5%) of the control group, and the statistically significant difference was: $t = 2.0$, $p = 0.04$. At the same time, in the treatment group at "- / -" the pathology was detected in 2 women (22.2%), which is statistically significantly less frequently than the group "+ / +", where somatic diseases were registered in 28 women (133.3%), namely, 1.3 somatic pathologies have fallen on one woman, $t = 8.0$, $p < 0.001$. In thewomen group "- / +", this pathology was detected in 14 women (31.8%), which is statistically significantly less often than in the group "+ / +", $t = 14.5$, $p < 0.001$.

Table 4

Reproductive losses in women with miscarriage, depending on the presence of mutations in the folate cycle gene models

	Treatment group					
	"–/–", n = 9		"–/+", n = 44		"+/+", n = 21	
	Abs.	P ± mp	Abs.	P ± mp	Abs.	P ± mp
Averageage, years	29,9 ± 2,5					
Reproductivelosses, number:						
- one (1)	9	100,0 ± 0,0	13	29,6 ± 6,9***	-	-
- two (2)	-	-	31	70,5 ± 6,9	-	-
- threeormore(3 and>)	-	-	-	-	21	100,0 ± 0,0
Gestational age at miscarriage, weeks:						
- up to 12 weeks	4	44,4 ± 16,6	9	20,4 ± 6,1	4	19,1 ± 8,6
- 13-21weeks	2	22,2 ± 13,9	32	72,7 ± 6,7**	14	66,7 ± 10,3*
- 22-31weeks	2	22,2 ± 13,9	2	4,6 ± 3,1	3	14,2 ± 7,6
- 32 and more weeks	1	11,2 ± 10,5	1	2,3 ± 2,3	-	-

Note: statistical significance of differences *p < 0,05, **p < 0,01,***p < 0,001 between groups.

Table 5

Gestation course features depending on nucleoid pattern in folate cycle genes

	Treatment group						Контрольная группа					
	"-/-", n = 9		"-/+", n = 44		"+/+", n = 21		"-/-", n = 39		"-/+", n = 12		"+/+", n = 2	
	Abs.	P ± mp	Abs.	P ± mp	Abs.	P ± mp	Abs.	P ± mp	Абс.	P ± mp	Абс.	P ± mp
Averageage, years	29,9 ± 2,5						29,1 ± 2,5					
Hyperhomocysteinemia	2	22,2 ± 13,9***	16	36,4 ± 7,3***	18	85,7 ± 7,6	-	-	1	8,3 ± 8,0***	1	50,0 ± 35,4
Burdenedobstetrichistory	3	33,3 ± 15,7***	19	43,2 ± 7,5***	21	100,0 ± 0,0	-	-	-	-	-	-
Somatic pathology:	2	22,2 ± 13,9***	14	31,8 ± 7,0***	28	133,3 ± 0,0	11	28,2 ± 7,2***	9	75,0 ± 12,5	2	100,0 ± 0,0
- anemia	2	22,2 ± 13,9***	12	27,3 ± 6,7***	21	100,0 ± 0,0	11	28,2 ± 7,2***	9	75,0 ± 12,5	2	100,0 ± 0,0
- arterialhypertension	-	-	1	2,3 ± 2,3***	4	19,1 ± 8,6	-	-	-	-	-	-
- varicoseveinsepidermally	-	-	1	2,3 ± 2,3***	3	14,2 ± 7,6	-	-	-	-	-	-
Pregnancycomplications (anamnesis):	-	-	36	81,8 ± 5,8***	42	200,0 ± 0,0	-	-	3	25,0 ± 12,5***	3	150,0 ± 0,0
- PTSDPost-Traumatic Stress Disorder	-	-	11	25,0 ± 6,5**	16	76,2 ± 9,3	-	-	2	16,7 ± 10,8***	1	50,0 ± 0,0
- threatened spontaneous miscarriage	-	-	21	47,3 ± 7,5***	17	81,0 ± 8,6	-	-	1	8,3 ± 8,0***	2	100,0 ± 0,0
Fetalcongenitalanomalies	-	-	4	9,1 ± 4,3**	9	42,9 ± 10,8	-	-	-		-	-

Note: statistical significance of differences *p < 0,05, **p < 0,01,***p < 0,001 in comparison with the group "+/+".

The somatic pathology in the control group was also detected statistically significantly more often in the group "+ / +" in 2 women (100.0 %) compared with thegroup "- / -" in 11 women (28.2 %), t = 10.0, p < 0.001 and in thegroup "- / +" in 9 women (75.0 %).

The following diseases were revealed in the structure of women's somatic pathology: anemia, arterial hypertension and varicose veins of lower limbs.

Only anemia with a different nucleoid pattern of folate cycle genes was detected in the treatment group women in the somatic pathology structurein 100 % of cases.

In the treatment group with normal homozygous pattern "- / -" the somatic pathology is also represented only by anemia (22.2 ± 13.9 per 100 women); no statistically significant difference with the control group (28.2 ± 7.2 respectively) is established, t = 0.4, p = 0.7.

Under the gene type "- / +" in the treatment group, the somatic pathology structure is presented as a decrease: anemia (27.3 %), arterial hypertension (2.3 %) and varicose veins of lower limbs (2.3 %), and the statistically significant prevalence of anemia compared with another pathology has been revealed, t = 3.5, p < 0.001. In comparison with the control group "- / +" (75.0 %), the statistically significant difference has been also revealed, t = 3.4, p = 0.001.

The somatic pathology was detected statistically significantly more often in the treatment group "+ / +" in 28 cases, i.e. one woman had 1.3 diseases each and the structure is presented as a decrease: anemia (75.0 %), arterial hypertension (14.2 %) and varicose veins of lower limbs (10.7 %). The statistically significant difference has been established between detected anemia (100.0 ± 0.0 per 100 women) and arterial hypertension (19.1 ± 8.6, respectively), t = 9.4, p < 0.001 and varicose veins of lower limbs (14, 2 ± 7.6, respectively), t = 11.3, p < 0.001. In the treatment and control groups by homozygousnucleoid pattern "+ / +" anemia has been detected in 100.0 % of cases, p > 0.05.

Considering the gestation complicationsin examined women, it should be noted that 78 complications were revealed in the treatment group, whereas only 6 complicationswererevealed in thecontrol group, p < 0.001.

Herewith, no complications were revealed in women with the homozygous normal nucleoid pattern "- / -" in both groups.

36 complications were revealedin the treatment group with theheterozygous pattern "- / +", which is statistically significantly more than in the control group (3 complications), p < 0.001.

The worst situation turned out to be under the homozygousnucleoid pattern "+ / +" in folate cycle genes; during the study, 42 complications were revealed in the treatment group, i.e. 2.0 complications per woman, which is statistically significantly more often than in the control group (3 complications), p < 0.001.

According to the complication structure, they were revealed in the treatment group were identified by decreasing: threatened spontaneous miscarriage, severe preeclampsia and congenital malformations of fetus / newborn. Comparing the treatment group women by heterozygous and homozygous polymorphism of nucleoids, it should be noted that the risk of spontaneous miscarriage was statistically significantly more frequent in the latter ("- / +" – 47.3 % and "+ / +" – 81.0 %), t = 4.5, p < 0.001, severe preeclampsia ("- / +" – 25.0 % and "+ / +" – 76.2 %), t = 3.0, p = 0.004 and congenital anomalies of fetus / newborn ("- / +" – 9.1 % and "+ / +" – 42.9 %), t = 2.9, p = 0.005.

The control situation in the group has turned out similar; pregnancy complications have been revealed significantly more frequent in women with homozygous polymorphism, p < 0.001, but no congenital abnormalities of fetus were revealedin this group. In the group "- / +", two cases of severe preeclampsia were detected (16.7 %), and in the group "+ / +" – one case (50.0 %); statistically significant difference was t = 3.1, p = 0.01. In addition, one case of spontaneous miscarriage was revealed in the group with heterozygous pattern of folate cycle polymorphism"- / +" (16.7 %), and in the group with homozygous pattern "+ / +" – in two women (100.0 %) The statistically significant difference was t = 11.5, p < 0.001.

Thus, during the study it was established the following:

1. The nucleoid pattern in folate cycle genes in women with miscarriage differs from the control group, and the difference is statistically significant, p < 0.001.

2. Homozygous transition of nucleoids is more often detected in the treatment group in comparison with the control group, p < 0.001.

3. Heterogeneous gene transitions are more frequentlyin women with miscarriage(59.5 %), p < 0.001.

4. The triple reproductive loss is typical forhomozygous transition of nucleoids, which is the worst version of gene carriage and is important in predicting miscarriage.

5. Heterozygous transition of nucleoids also plays a significant role in miscarriage, since such gene pattern is established in women with one-time and two-time fetus loss, p < 0.001.

6. The single reproductive loss has been detected with the normal homozygous-type nucleoid pattern, $p < 0.001$.

7. The critical stages of pregnancy termination for homozygous transitions were the period up to 12 weeks (44.4%), for heterozygous – 13-21 weeks (72.7%) and for the normal gene pattern – 13-21 weeks (66.7%) $p < 0.001$.

8. Hyperhomocysteinemia was revealed statistically significantly more often in the homozygous transition group in comparison with another gene pattern, both in the treatment group and in the control group, $p < 0.001$.

9. The aggravated obstetric history has been revealed in 58.1% of women with miscarriage, statistically significantly more often in the group with homozygous transition, $p < 0.001$.

10. No gestation complications were revealed in women of both groups with the normal homozygous nucleoid pattern, $p > 0.05$.

11. The worst situation has been revealed statistically significant in women with homozygous nucleoid transition as compared to other groups, $p < 0.001$.

Conclusion

The analysis of various nucleoid transitions in folate cycle genes has enabled to reveale the important role of genetic predisposition in predicting miscarriage, and the worst outcome was in women with homozygous nucleoid transitions. Considering the data obtained in the study, at the stage of pregnancyplanning it is necessary to reveal timely the miscarriage predictors and to level their action by taking folates for prolongation and reduction of gestation complications.

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MECHANISM OF ALLERGY DEVELOPMENT IN HUMANS

Shamitova E.N., Myasnikova I.A., Egorova I.V., Gilfanova A.R.
I.N. Ulianov Chuvash State University, Cheboksary, e-mail: shamitva@mail.ru

Studying the mechanism of allergy development in humans of different age will promote to creating a new medicine to eliminate the disease forever. The mechanisms of allergy development are divided into two types: a delayed-type allergy and an immediate-type allergy. The problem is relevant as allergic reactions have various consequences; scientists face the task to understand causes of allergy to eliminate them in future. To study the mechanism of allergy development, the authors performed questioning using Google forms to find out the types of allergies most common to Russia's residents. The rating poll was offered for respondents suffering from allergy, it included the list of allergens, symptoms and a short explanation of allergy causes. 300 persons of both genders, aged mostly 18-55 years participated in the survey. Respondents were selected for a good reason, as people of different age suffer from different types of allergic manifestations.

Keywords: allergy, mechanisms, allergic reaction, organism, immunity, allergen, immediate-type hypersensitivity, delayed-type hypersensitivity

Allergic diseases represent the most frequent pathological forms of immunity, caused by an excessive immune response, and that's one of the relevant issues nowadays. Among the most actively disputed problems, associated with allergic diseases, are: investigating the role of the genetic background in progression of such diseases, evaluating predisposition to diseases of one type, which result in progression of other types of disturbances, as well as the probability that one immunopathology eliminates the development of another.

Not only internal but a lot of external risks factors as well are common in progression of allergic diseases. The immune system can be affected by pathogens of contagious diseases, medicines, various toxic substances, etc. They cause reactions of hypersensitivity to external allergens or disturbances in recognizing its internal antigens. Besides, medicines, chemical substances, food, wool, hay fever, insects and others are also risks factors, which cause disturbances of protective barriers and penetration of allergens into the organism.

Partially, mechanisms of allergies have already been investigated by scientists up to date. It's agreed to divide them into:

– Hypersensitivity of immediate type (HIT)
– Hypersensitivity of delayed type (HDT)

It's found out that the HIT very often manifests fast: from several seconds to 12 hours. In most cases the allergic reaction manifests within 30 minutes.

HDT, in turn, manifests only in 24-72 hours.

The allergy is accepted to be divided into T-lymphocyte dependent and B-lymphocyte dependent. Scientists offered five types of allergic reactions in all:

– Reaction of immediate type (It is preconditioned by a contact with IgE antigen)
– Cytotoxic type (the reaction takes place after repeated blood transfusions)
– Arthus type (develops in food allergy)
– Reaction of delayed type
– Receptor mediated type

In allergy immunoglobulins M, G, A, D and E are activated. The main function of an antibody is eliminating alien antigens. IgM is first produced after antigens' penetration in the body. IgG is a secondary immune response. IgA is an actively synthesized immunoglobulin in the body. IgD makes the immune defence stronger. And the rise of IgE in the body is characterized by allergic reactions development.

Antibodies, in their turn, divide into 4 types:

– Cellular ones (aggressive)
– Blocking ones (they block allergens)
– Free ones (they are sited in blood)
– Bystanders (they do not take part in reaction)

The aim of the research is to reveal different types of allergic reactions, to which people with weak immunity are often vulnerable using a questionnaire.

As we know, the reaction of immediate type hypersensitivity underlies the majority of allergic diseases. An allergen stimulates Th2-cells differentiation and proliferation of B-lymphocytes, which produce IgE under the influence of cytokines. These antibodies bind with receptors on the surface of mast cells and basophiles, starting a typical effector response and causing an allergy.

Antibodies revealing is closely connected with the concept autoallergy. It's a pathological process, based on production of IgE-antibodies against the body's own antigens. The process is triggered by environmental allergens, which have structural or immunological similarity with human proteins. Binding with IgE-autoantibodies on the surface of the mast cells,

autoantigens induce a release of inflammation mediators and progression of immediate type hypersensitivity reaction. At this, autoantigens' presentation by dendritic cells or monocytes mediated by IgE can cause T-cells proliferation, cytokines releasing and progression of delayed-type allergic reaction. The forming antigen-antibody immune complexes could be carried by the bloodstream all over the body and bind with all cells, which have IgE receptors, causing inflammatory processes in various organs.

It's been lately proven that CD4+CD25+Foxp3+Treg are able to prevent progression of both allergic and autoimmune diseases. Treg control the immune response, suppressing the activity of such immune-competent cells as: CD4+ and CD8+ T-cells, B-cells, natural killers, antigen-representative cells and mononuclears, and it controls antibodies production as well. Their function is provided by means of suppressive cytokines secreted, inactivation of proinflammatory IL-2, cytolisis, reduction of costimulation and submission of antigens.

TIM are highly conservative proteins, which are expressed on the cells of the immune system. They are represented by 3 types: TIM-1, -3, -4. Interaction of those types causes progression of Th2 immune process with a generation of a humoral immunity reaction. TIM-3 represented in those who have a food allergy, and it is located on intestinal epithelial cells. TIM-4 inhibits progression of allergic reactions [1].

During cytotoxic hypersensitivity responses IgG and IgM interact with antigens on the cell's surface. Its manifestations can be contact cytolisis, predominantly implemented by cytotoxic T-lymphocytes, natural killer cells. Another mechanism is represented as antigen-antibody complexes, which form on the membranes, involve the complement system and trigger lysis of target cells.

Formation of immune complexes occurs in hypersensitivity reactions of immunocomplex type (Arthus phenomenon). They form because of interaction of external and internal antigens with IgG- or IgA-antibodies, which gather in tissues, causing their inflammation. Circulatory immune complex (CIC), which circulates in bloodstream freely, forms in interaction of IgG with antigen. And then it binds with other components and gets phagocytosed [2]. Arthus reaction develops in repeated antigen introduction, which forms an immune complex in the place of its penetration. It manifests by edema, inflammation and necrosis.

The fourth type of immunopathological reactions (hypersensitivity of delayed-type) is conditioned by macrophages and Th1-lymphocytes, which are responsible for cellular immunity stimulation. HDT is caused by CD4+T-lymphocytes and CD8+T-lymphocytes, which secrete cytokines, which activate macrophages, and induce inflammation. In some disturbances CD8+CTL(cytotoxic T-lymphocytes) kill directly the target cells, which carry MHCI+allergen complexes.

The receptor-mediated type is conditioned by producing antibodies to cells' receptors. When they bind together with receptors, they block or imitate the mediator/hormone working [3].

Some attention should be paid to the factors, which have a positive influence on an allergic reaction to start. It's not a secret that contacting with the environment is very good for a human body. But in conditions of a mild climate a park with a big number of poplars, maples, birches, oaks, lawns, covered with various kinds of flowers, become a potential enemy to allergic people [4]. In recent years scientists observe an increasing tendency of respiratory allergies to pollen [5].

South-East Asia authors incline to the opinion that the environment has an active influence on children younger than 6 years old. Environmental pollution cause asthma, eczema and rhinoconjunctivitis [6].

Very often an allergic reaction is caused by the food we eat. For instance, a daily food ration of every third citizen of our planet includes sweets. The common reason to like it is its taste. That's why chocolates are so popular and widespread, but they cause allergic reactions as well[7]. But not only confectionary is harmful to our bodies. Common food allergens are citrus fruits, mostly oranges [8].

Children are vulnerable most frequently to these processes. The American scientists found out that children younger than 6 years old suffer from allergic reaction to cow milk, and, first of all, that one has a negative influence on the immune system development [9].

Cashew allergy more often becomes a big issue not only for children but for adults as well: it's life-threatening because of anaphylaxis. Anaphylactic shock is a dangerous form of allergy; it's very dangerous for a human being. The European scientists, struggling against the allergic reaction to cashew-nuts, decided to mark the food, containing this product [10].

Reactions to allergens, in a way, are different: in addition to rash, anaphylactic shock, it manifests as urticaria, allergic dermatitis, lung

obstruction syndrome and Quincke's disease, which affects 95% of people. The disease is a reaction to an allergen, it swells up areas of skin and changes the person's appearance[11]. Nettle-rash (or urticaria) makes human body cells die, old age comes faster, strong weakness develops which in most cases results in death[12]. As a consequence of food allergy, the following symptoms can be seen: vomiting, cramps, food refusal, stomach pain, headache. The common causes of it are: side effects of medicines, contagious diseases, IBS[13].

It's very important to investigate the factors and mechanisms of allergy and to prevent it, because it will promote changing the immunity development, decreasing the risks of infections and chronic immune diseases as well as preventing death outcome[14].

Methodology and results of the research

We performed an inquiry using Google forms to investigate the most common causes of allergy. The investigation was performed in 2018. Respondents, who suffer from allergy, were offered to pass an interview (a rating-poll). It included the list of allergens, symptoms and a short explanation of allergy causes (table).

The interview was performed with people of different ages, mostly aged 18-55. The given choice of respondents was not random, because there were people of different ages, who suffer from various allergies. In total there were 300 respondents. After analyzing the interview, we could make up the following statistics (Fig. 1):

Types of allergic reactions

Allergen	Symptoms	Causes of allergy
1. Food	Pain, nausea, stomach disturbance, skin rash, breathing problems	Food (citrus fruits, nuts, milk etc.)
2. Wool	Nasal stuffiness, tearing, coughing	Develops after contact with an animal (or just wool)
3. Chemicals	Eczema, itching and skin redness	Using powder, chlorine, soaps for the dishes
4. Hay fever	Nasal stuffiness, eye itching, edema and redness of eyelids	Develops because of dust or pollen at home
5. Medicines	Rash, skin redness	Caused by aspirin or penicillin
6. Insects	Itching skin, red swollen spots, tearing eyes	Bites of ants, wasps , bees, mosquitoes

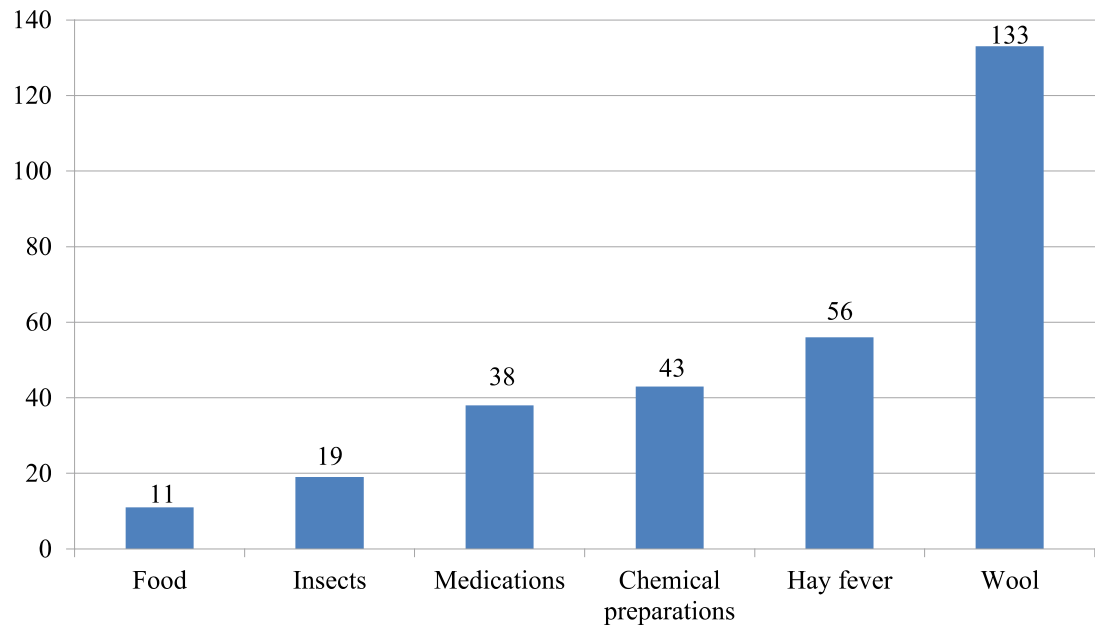

Fig. 1. Most common types of allergies in Russia

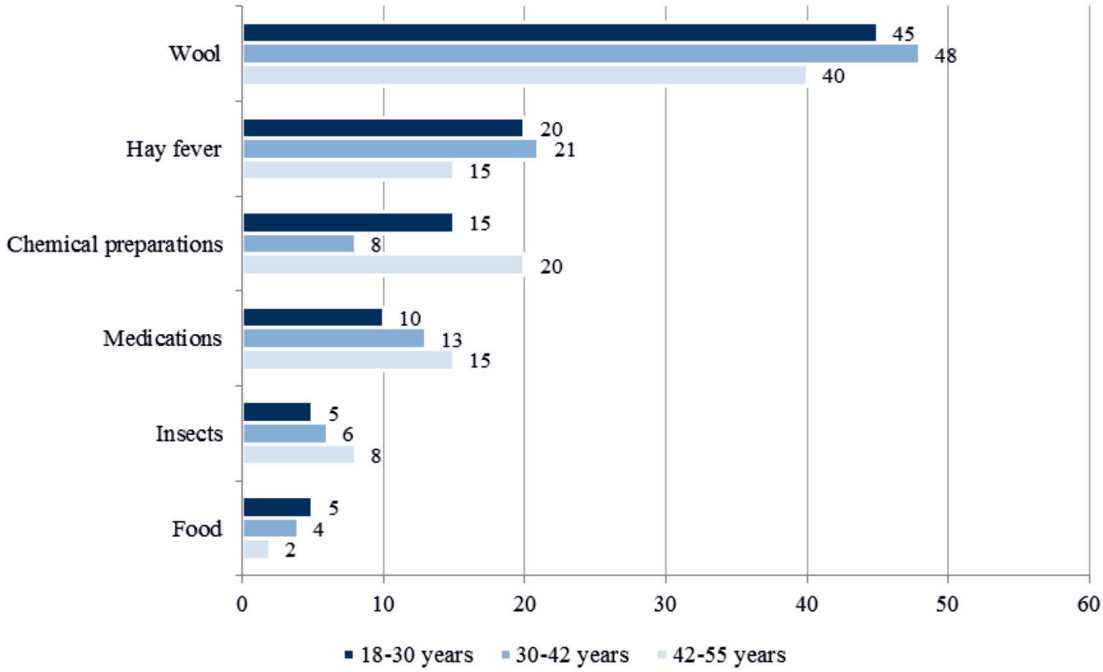

Fig. 2. Most common types of allergies in people of different ages

The minority of food allergy percentage and wool (or allergy to home animals) allergy predominance are observed. And, to get the whole picture of it, we offer a diagram with their proper percentage (Fig. 2).

Respondents aged 18 to 30 mostly suffered from pet wool (45%), 20% of them suffered from hay fever, 15% had allergic reactions to chemicals, 10% were allergic to medicals and only 5% of them complained of food allergy and allergic bites of insects. The answers showed that young people reacted mostly to two natural indicators: wool and hay fever (poplar wool, fluff, bloom).

The allergic group of people aged 30-42 showed the next results: 4% of them suffered from food allergy; 6% of the group had an allergy to insects' bites; 13% suffered from medicals; 8% suffered from chemicals; 21% were vulnerable to hay fever; the predominant majority suffered from pet wool, it's number is 48%.

The allergic people aged 42 to 55 were vulnerable to wool (40%); 15% of people – to hay fever; 20% – to chemicals; 15% – to medicines; 8% – to insect bites and only 2% were allergic to food. In comparison with the group of young people, the respondents of this category were more vulnerable to chemical and medical conditions, but not to natural ones. And here also we see the predominant role of the pet wool allergen.

Conclusion

We analyzed the answers obtained through the above-mentioned interviewing test. And thus, we can conclude the following: people of different ages are equally vulnerable to numerous types of allergic reactions. That's why it's one of the main issues of healthcare to fight (and we hope, to win) the disease, talking to it in its language, perhaps not easy to get sometimes, and using the weapon, which kills it. It's so much important nowadays to understand the mechanisms of allergy, to distinguish its types and how exactly we should struggle with it, not only eliminating its symptoms temporarily, but getting rid of it so as the patient could enjoy the rest of his life without any allergy. The need to fight allergies will put an end to immune system weakening and fatal outcome.

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NEURO-LINGUISTIC PROGRAMMING AS AN EFFECTIVE TOOL IN TEACHING ENGLISH

Satbek L.M., Akynova D.B.

L.N. Gumilyov Eurasian National University, Astana, e-mail: laura.satbek@mail.ru, akynova.d@yandex.kz

The article deals with the main points of the neuro-linguistic programming in regards to the foreign language teaching. As the requirements for the study of foreign languages include communicative competence it is necessary to apply the effective techniques to develop the language skills. The analysis showed the effectiveness of using neuro-linguistic programming techniques in teaching a foreign language. The paper gives a review of the emergence of neuroscience and its connection to the study of foreign languages. The authors analyze the levels of learning and development in connection to neuro-linguistic programming. Neuro-linguistic programming is considered within main representative systems, which are highly relevant in teaching a foreign language. Studying a foreign language is considered by means of perception conditions, consciousness, subconsciousness, anchors, associated images, and dissociated images. The overall analysis illustrates the effectiveness of using neuro-linguistic programming in teaching foreign languages. It assists in acquiring a foreign language in a more efficient way.

Keywords: neuro-linguistic programming, English, levels of learning, representative systems

Currently, the requirements for the study of a foreign language are quite high, since one of the tasks facing the teacher is the formation of students' communicative abilities. That is why the use of various methods and techniques allows you to open new learning opportunities. Neuro-linguistic programming (NLP) is one of the most powerful psychotechniques, which helps to change oneself and others in the most effective and elegant way. NLP emerged in the early 1970s and was the fruit of the collaboration of John Grinder, who was then an assistant professor of linguistics at the University of California at Santa Cruz, and Richard Bendler, a psychology student at the same university. Richard Bendler was also interested in psychotherapy. Together they studied the actions of three prominent psychotherapists: Fritz Perls, an innovator of psychotherapy and the founder of a school of therapy known as Gestalt therapy, Virginia Satir, a family therapist who managed to resolve such difficult family relationships that many other family psychotherapists found impregnable, and finally, Milton Erickson, the world famous hypnotherapist [1].

In the spring of 1976, Grinder and Bendler gave the name to their work – neuro-linguistic programming, a cumbersome phrase that hides three simple ideas. The "neuro" part reflects the fundamental idea that behavior originates in the neurological processes of vision, hearing, smell, taste, touch and sensation. We perceive the world through our five senses, we extract the "meaning" from information and then follow it. Our neuroscience includes not only invisible thought processes, but also our visible physiological reactions to ideas and events. One is simply a reflection of the other on the physical level. Body and mind form an inseparable unity, a human being. The "linguistic" part of the title indicates that we use language to streamline our thoughts and behavior and to communicate with other people. "Programming" refers to the ways in which we organize our ideas and actions to get results [2].

NLP distinguishes the following levels of learning and development:

– environment (external opportunities or restrictions on activities, place, time and material conditions necessary for its implementation);

– behavior (specific steps, actions or operations necessary to achieve the goal);

– abilities (a system of cognitive maps, plans and strategies, criteria for selecting and evaluating specific actions);

– beliefs and values (the motivation and choice of the general direction of activity, taking into account the existing abilities, goals and conditions; the answer to the question "why?" Regarding this activity and its psychological reinforcement);

– identity (the awareness of a person of his role, the answer to the question "who?" Regarding this activity);

– mission (understanding of its task within the framework of a larger system, of which a person is a part – families, groups, etc.)

The application of this concept to the context of leadership in education allows you to notice different levels or styles of leadership, depending on the focus of the teacher's attention in the implementation of the educational process – providing the necessary conditions, behavioral competence (skills), development of abilities (training and in a wide range), education of the individual and etc [3].

In NLP, a lot has been said about the various ways of structuring experience. One of the presuppositions of NLP is: "Experience has its

own structure." At the same time, as we have already noted, it is believed that people differ in the dominant channels of perception, storage and transmission of information. So, according to some (unverified) data, the visual channel predominates in 40 % of people, in 40 % – the auditory channel, in 20 % – kinesthetic.

In recent years, a sea of various materials has appeared for the study of foreign languages. And any person (especially who decided to study his first foreign language) is often not sure where to start this way: buy a textbook, audio, video course, or even go to courses. Full knowledge of a foreign language at the level of your mother tongue implies that, when communicating with you, they will not be able to distinguish you from "their own", as if you were growing up in a country whose language you are learning from infancy. The only thing that can give you the color of your skin or facial features when dealing with carriers is, but, as you understand, this goes beyond our competence. Thus, full-fledged knowledge of a foreign language implies a complete understanding of the language in the vast majority of situations and its correct use also in the vast majority of situations; in both cases, first of all – oral, but, of course, written (compare with the native language). Here it is necessary to emphasize one important point: a full-fledged proficiency in a language includes the ability to understand, the ability to speak and write in a given language, but not the ability to explain certain linguistic phenomena.

With regular lessons on studying a foreign language with maximum efforts, your vocabulary a year later will be at least 10-12 thousand words (of which more than half are active vocabulary). When reading modern literature or watching a modern film, we are not immune from the fact that the writer or actor uses some rare words, expressions, special terms, or we are faced with some social reality that has not yet been encountered while learning the language. And believe me, if you really want to qualitatively understand oral and written speech in a foreign language, not one of these 10 thousand will be superfluous. Sometimes there are articles where the figures are cheerfully given, which, they say, actively carriers in such and such language use only 500/1000/2000 words, so guys learn this 1000 words, and that's all – you know the language. The figure, of course, is seductive, but, having only 1000 words, do not expect that you will understand well films, television, radio programs and even more so fiction or the press. Thus, after reaching the optimum goal, the level of proficiency in a foreign language will approximately correspond to the level of your teenager's native language of sixteen from an intelligent family who, at the age of 11-12, immigrated with his parents abroad. Of course, after immigration, the family continued to speak their native language. Thus, you will have the correct pronunciation, you will have a tremendously developed sense of the language, you will become easy to express yourself in it, but to fully master the language you will lack vocabulary, plus you will not be familiar with some of the social realities of the country of the language being taught. But, as you understand, this can be quickly typed by reading literature containing the necessary vocabulary, as well as watching television news, serials, and films "for volume". Here I will make a reservation: maybe the language will drag you down so much that in a year you will have time to read and become familiar with the social realities of the country of the language being studied in a sufficiently large volume and achieve full-fledged knowledge of a foreign language.

This is the minimum necessary to achieve the goals of the optimum program. Here I proceed from the assumption that a person can really be physically busy (you need, for example, to study at a university, earn money to feed a family). If you are not sure that you can find one hour daily for classes, I advise you to think three times before you begin to learn any foreign language. If we imagine language learning in the form of a car race, then any decrease in the intensity of classes (less than one hour per day, skipping classes) is not even a brake on language learning, but a 180 ° turn and riding in the opposite direction. If your language classes are irregular, then you will not "reach", and you will only hang out at the beginning of the distance or even near the starting line. Or, for example, such an analogy: imagine that learning a language is like swimming along a river against a stream. The slightest loss of pace – and blows you back. DO NOT SWIM ! Maybe, of course, you will then overcome the same distance a little faster – you learned to swim, but you still have to overcome it, no matter how cool. By the way, the exact same thing applies to your native language: without active use, the process of forgetting a language is inevitable. On the other hand, this time – one hour per day – can be increased, and without limit. With the right motivation and a good selection of interesting materials, your desire to study the language will be so strong that you do not want to break away from classes [4].

In NLP there are three main representative systems: visual (visual), auditory (auditory), kinesthetic (sensitive). Through these three systems, a person receives 99% of the information from the surrounding world (they also emit the olfactory-hustatory system, but I will not dwell on it). There is an important point. Take, for example, these three situations. The first situation: stand in front of the door and look at it – in this case, you receive an external visual signal from the outside world. Another situation: remember the color of the door in your room. In this case, the brain also receives certain information, though from itself, and this is an internal visual image. Third situation: imagine what you would look like with red hair. In this case, the brain again receives information (again from itself), which is also an internal visual image, but this is a constructed image in contrast to the previous, recalled, visual image. The same can be done for a different modality, for example, the audio one. Suppose you hear music on the radio – this is an external audio signal. Now you remember your favorite song – this is an internal recalled auditory image. Can you imagine further how your favorite song, played in an accelerated pace, sounded, is an internal constructed auditory image.

Perception positions

There are three main positions of perception. Suppose you are talking to a friend. The first position: you see the process of communication with your own eyes, you hear it with your own ears, you are experiencing the process of communication with your senses. The second position: you put yourself in the shoes of a friend and imagine what he can see, hear and feel during the conversation. Finally, the third position: you imagine how you and a friend look from the outside, how your dialogue sounds to someone third.

Consciousness / Subconscious

The term "consciousness" means everything that your attention is directed to at the moment. The subconscious is what is in memory, as well as those parts of your life experience that you are used to and which you don't pay conscious attention to at the moment. For example: you walk down the street, in one hand – a bag, you remember the events of yesterday. To rearrange the legs, you do not exert the slightest effort of your conscious attention, nevertheless do it correctly, "on the machine"; you do not pay attention to the fingers of your hand, clutching the handle of the bag, nevertheless they hold it tightly. Let us take as an example the speech in the native language: you do not think about where to put the subject and predicate, how to verb one or another verb. The processes of building sentences occur unconsciously, naturally. Virtually any complex skill that a person possesses is realized unconsciously. For example, a professional musician, when performing a work he has learned, does not think about where to put his index finger at one time or another, which key to press, he is excited by other – creative – tasks. It is not necessary that the skill that you unconsciously develop as a result of a step-by-step conscious understanding of its component parts, such as occurs when you learn to solve quadratic equations using a math textbook or learn to print using a 10-finger blind method using a self-guide. Sometimes the unconscious skill can be acquired without the participation of consciousness. Suppose you talked for a long time with a person who has a habit of saying a parasitic word like "as it were". After some time, you can include this little word in your speech, although you have never paid conscious attention to it either in the speech of this person or in your own. We can also give an example: a child learns his native language and as early as three years says: "This is a girl. I see girls. Surely none of the parents explained to the kid that the "girl" is a feminine noun, of the 2nd declension, so the ending changes in the accusative case. Skill correctly incline nouns child has acquired unconsciously.

Anchors

Has it ever happened that you hear a familiar song, and its melody, words cause you to recall specific situations? Or, looking at a photo of your school, do you suddenly remember a physics lesson in 7th grade? Both the song and the photo in this case are anchors for you, that is, external (most often) stimuli that cause you to have any feelings or make you remember any visual and / or auditory images. Unlike visual (photography) and audible (song) anchors, there are kinesthetic anchors. For example, if a person who is in a joyfully excited state presses his hand on his knee, then this state will "anchor". After some time, when you need to make yourself excited, you just have to press your knee in exactly the same way.

Associated / dissociated image

Suppose you swim in a pool. Associated image: you see, hear, feel directly while swimming. Dissociated image: you imagine

yourself floating in a pool, that is, you see how this person swims, how he waves his arms; this person is you.

Condition

A state is a combination of the neurophysiological characteristics of an organism at a given point in time. There is a state of total immersion in something, absolute involvement (for example, in reading a textbook, in a game of tennis). In the state of "reading a textbook", you are unlikely to be able to play tennis well, and in the state of "game of tennis", you are unlikely to be able to tell anyone convincingly something. When learning a language, you will need special states, and we will talk about it again. For example: Bandler and Grinder. What allowed them to learn quickly? Why did others fail to grasp the actions of a genius, but did they succeed? The secret is HOW they learned the behavior of a genius: they copied the actions of a simulated person! Thus, the basic scheme looks like so: saw + heard + repeated [5].

As we clearly see from the abovementioned, NLP techniques help us acquire the foreign language in a more effective way. Therefore, the teachers of English should take into account the efficient NLP techniques to boost the learners' productivitiy.

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ON THE ISSUE OF CODE-SWITCHING

Ybyray B.N., Akynova D.B.
L.N. Gumilyov Eurasian National University, Astana, e-mail: Bakyt_1997@mail.ru, akynova.d@yandex.kz

The article deals with the main points of the theory of code-switching which is considered to be the least studied issue in Kazakhstani linguistics. The capability to switch codes shows an adequately high level of language proficiency and a certain communicative and a general culture of a person. Mechanisms of code-switching makes sure understanding between people and provide convenience of communication process. On the contrary, inability of a person to vary his speech depending on the situation of communication and being accustomed to only one code is believed to be as an abnormality. As a result, different intercultural or communicative misinterpretations may occur. In most cases, people get amazed when they hear conversations which are produced in two or more languages. Negotiations on daily topics taking place in such natural way are the subject matter of this study. The analysis showed that the phenomenon of code-switching depends on different factors and occurs naturally in the speech.

Keywords: code-switching, insertion, interlocutor, language alternation

The term code-switching (or, as it is sometimes written, codeswitching or code switching) is widely discussed and used in linguistics. The most common definition of code-switching is using two or more language varieties in conversation.

Concerning code-switching, the active research continues for about half century. During this time it has been developed into an independent linguistic discipline. This fact is explained by the increased interest in the difficulties of language contact.

A pivotal thing for understanding the nature of various types of code-switching is K. Myers-Scotton's opposition of 'marked' and 'unmarked choice' in code-switching. When the speaker follows the established rules of speech behavior in the language community and makes switching in accordance with the expectations of the listener is called 'unmarked code-switching'. But if the speaker consciously produces switching in a way that it is noticed as a deviation by the interlocutor it is called 'marked code-switching' [1].

To the latter position is quite close Peter Auer's view where he proposed to distinguish cases of a combination of two languages from code-switching in which their usage is not local for speakers but it possesses rather global meaning, i.e. is not determined by the specific features of the situation and that such use of languages is accepted in this community [2].

Milroy and Muysken (1995) suggests "perhaps the central issue in bilingualism research is code-switching" [3, p.7]. In fact, regarding the studies on bilingual speech, it can be proved that bilinguals have a tendency to mix their languages in a process of communication. Consequently, such mixing has been evoked misinterpretations as bilinguals do not possess enough competence in communicating one or both languages.

According to Chirsheva, in multilingual world, interplay of languages, bilingualism and bilingual type of communication are becoming a widespread phenomenon [4, p.23]. It is believed that a person who speaks two languages is able to participate in two monolingual conversations as well as in bilingual types of communication. A characterization of bilingual type of communication is interplay of languages which include forms such as interference and code-switching. Bilingual type of communication is described with incomplete deactivation of one languages and with gradation of activity of two languages in speech of bilingual while producing an utterance. In a production of speech, a person who possesses two languages may deactivate first language incompletely which provides an interference in speech in second language which mostly occur in monolingual type of communication. When a bilingual is having a conversation with other bilinguals, it can be seen gradation of activity of two languages which is called bilingual speech.

Muhamedova and Auer assume that languages have a potential to be mixed in such a way that language A is considered as a dominant language and language B is an embedded language [5, p.35]. Embedded language can be inserted in the forms of phrases or even single words into the grammatical frame determined by language A (matrix language). The grammatical frame of the sentence is provided by the grammar of language A (matrix language) whereas language B (embedded language) is utilized only in complex insertions in order to define the structure of inserted constituent.

Code-switching examines ways of dealing with the difficulties and language barriers

occurring while sentence-planning by using elements of two or more languages. This phenomenon particularly noticed in child's speech when they make errors and have some problems in acquisition of phrases or sentences. From the psycholinguistic point of view, one of the crucial feature of code-switching is flexibility of language production. Psycholinguists consider the problem for debate called as 'coordination problem' which means the fluent achievement of speech.

In terms of language contact, code-switching or language alternation is a transition of the speaker from one language to another in the process of speech communication. A similar pattern is observed in societies where two (or more) languages are used rather than one. It is believed that bilinguals resort to code-switching because they can not express their thoughts in one language. To some extent, it is a truth and inability to transfer what they want to say force them to switch to another language in order to compensate those omissions.

According to the researchers, it is in bilingual (multilingual) language teams native speakers receive an opportunity of contrastive based on intuitive deductions contradistinction of two different language systems. Bilinguals, i.e. people who speak two (or more) languages usually "distribute" their usage depending on the conditions of communication, for instance, in official meetings where dominant language is only one while communicating with the authorities but in everyday life (in the family, contacts with neighbors) using several languages simultaneously is acceptable.

Code-switching can be induced, for instance, by the change of addressee, i.e. the one to whom the speaker addresses. If the addressee speaks only one of the two languages that the speaker knows, then, the latter, no doubt, has to utilize a language which is familiar to the addressee. Although, until this moment in communication with bilingual interlocutors another or both languages could be used. Switching to a known language code can occur even in the case of changing group members. For example, if a third person owning only one language joins to the conversation of two bilinguals and that language known to these bilinguals, they will speak in the language of the third person. Refusal of interlocutors to switch to the code familiar to the third participant of communication can be regarded as an unwillingness to involve him to a conversation or as a neglect to his communicative inquiries.

The factor that evokes code-switching can be a change of a role of the speaker. Take, for example, the role of a father (when communicating in the family) he can use a convenient code for him but when turning to the authorities, he forced to switch to more or less conventional forms of speech.

The topic of conversation also influences on a choice of code. Researchers who dealt with the problems of communication found out that members of a certain sphere have discussions in a language that has the appropriate special terminology which describes technical processes, devices, instruments, etc. But as soon as a change of a theme occurs from production to household, another language code switches on: native language or dialect of interlocutors. In a monolingual society, with such a change of code there is a switch only from professional language to vernacular language means.

Code-switching can be used by bilinguals as a "sociolinguistic tool" or "technique" [6].

Code-switching can serve for the expression of speaker's solidarity from a certain social group. When a listener responds to a code-switching with the same switch, a specific connection is established between the speaker and the listener. At the same time, exclusion of unwanted listeners (who do not speak the language to which interlocutors switch) can happen. Sometimes a code-switching is used to show the attitude of the speaker to the listener. While monolinguals express their relation by varying the content of speech, bilingual speakers often use a code-switching for this purpose.

Code-switching may also serve to impress a listener. If bilingual interlocutors are used to communicate in a certain language, switching from one language to another is unexpected for the interlocutor and evokes a "special effect". In other words, a code-switching is not only a linguistic but also a sociolinguistic phenomenon [7].

As a rule, the situation of full bilingualism in the language team has two immensely opposite consequences. On the one hand, as it has mentioned above, native speakers have a possibility to make a contradistinction of two systems and, as a result, understanding of structural differences. On the other hand, constant use of two languages simultaneously expressed in permanent switching of codes, native speakers cease to distinguish codes which they use [3] and there is a possibility of interference. Therefore, it should be noted that code-switching and interference have an absolutely difference which is that interference implies modification of grammatical, syntactical or phonetic forms of one language under the influence of another but not the change of one language to another.

Furthermore, code-switching contributes to the implementation of the act of communication whereas interference indicates mixed usage of different language norms or rules which can lead to misunderstanding. Interference mainly depicts the relationship between language systems when they are in contact and code-switching has to do with bilingualism itself. Thus, it can be concluded that interference may manifest in speech of bilingual along with code-switching. However, it is vital to distinguish described phenomena [8].

It should be noted that there are three main categories in the study of the problem of code-switching in modern researches. To the first category belong researchers who investigate "extrasentential" (or "intersentential") code-switching. In this way, some representatives of theoretical linguistics and psycholinguistics conduct their research. According to N. Kamwangamalu, representatives of theoretical linguistics primarily examine grammatical aspects of code-switching [9]. Psycholinguists are interested in how sentences are generated from code-switching, is there a difference between sentence construction of monolingual and bilingual speakers and the number of grammatical systems that are included in a sentence with code-switching [10].

The second category includes scientists who follow sociolinguistics. They are not so much interested in a difference between "intra-sentential" and "intersentential" code-switchings as in finding out the reason for the existence of such phenomenon code-switching among bilinguals.

The third category entails linguists who conduct researches on code-switching in the frame of communicative and pragmatic approach. P. Angermeyer claims that representatives of this category aim to scrutinize the structure of communication process in which a phenomenon of code-switching takes place. Moreover, he attempts to figure out the role of switching codes in establishing the order of replicas of interlocutors, thematic construction of communication process, starting a conversation and continuing a talk on a certain topic, switching from one topic to another, etc. [11].

What are the parts of sentences where switchings take place? It depends on the nature of impact of those factors just discussed above. If the speaker can foresee and even plan the influence of a particular factor, then the switching occurs naturally, i.e. at the end of the phrase with the most quite mode of communication – at the end of the discussion of any topic. However, if the intervention of the factor inducing code-switching is unexpected for the speaker, he can switch from code to code in the middle of the phrase sometimes even without saying a word. In case of high level proficiency of codes or sub-codes, the process of code-switching may not be realized by the speaker if their use is highly automated. Especially in cases where another code is not entirely used but in fragments. For instance, a person can insert elements of another language into his speech such as idioms, modal words, interjections, particles.

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THE IMPORTANCE OF THE LINGUACULTURAL APPROACH IN TEACHING THE RUSSIAN LANGUAGE OF NATIONAL GROUP

Arypbekova D.Zh.

Naryn State University named after S.Naamatov, Naryn, e-mail: arypbekova.dria@gmail.com

This article discusses the role of the linguacultural approach in the study of the Russian language as non-native. It is emphasized that in order to implement the intercultural communication successfully, it is necessary to develop the concept of linguacultural competence among students, the basic principles and methods of the linguacultural approach are highlighted. This approach reveals the cultural-oriented content of a language and a speech, the study of culture through the language. Linguculturology is focused on a new system of cultural values, which put forward by new thinking, the modern life of society, and also on complete, objective information about the cultural life of the country. The main unit of description for this approach is the linguoculturema – a special complex unit that represents the dialectical unity of linguistic and extra linguistic (conceptual and subject) content and includes the segments not only of a language (linguistic significance), but also of a culture (extra-linguistic cultural meaning) which represented by an appropriate sign. The fiction texts record certain cultural norms; they are the source of cultural information. The fiction text as a source of cultural background knowledge can be presented in different forms, to bear the author's world outlook, picture or image of the world, the meaning of past and subsequent cultures. A cultural material of the selection of texts should have a practical orientation, contain tasks that develop the ability to interpret cultural information, be fascinating and relevant, and have a cognitive character.

Keywords: linguistic and cultural approach, linguoculturema, ethnolinguistic, socio-cultural

A very important cultural reference point of modern foreign language education is linguoculturology as one of the most actively developing areas of knowledge in recent times.

The linguo-cultural approach in teaching foreign languages was formed in the 90s. What studies linguoculturology? This is a science that studies objects and phenomena of a particular culture, concepts. The subject of the study of cultural linguistics is the cultural background – a world perception which is specific to a particular nation, represented in mythology, legends, proverbs, sayings and in other forms of folklore in precedent texts. According to the researcher V.A. Maslova, the subject of study of linguacultural studies are the standards, stereotypes, symbols, images, speech behavior and speech etiquette [6, p. 37].

The following methods of studying cultural concepts are distinguished: "analysis of proverbs, aphorisms, inner form of words, precedent texts, plots of works of art, psycholinguistic experiment with native speakers" [6, p. 37].

V.N. Telia considers linguoculturology as a part of ethnolinguistics, which devoted to the study and description of language and culture correspondence in their synchronous interaction.

Researchers note that, finally, that the merging of problems of linguistic knowledge into the one interdisciplinary field may lead to the fact that it will be possible to speak about linguoculturology not only as synthesizing, but also as systematizing science [7, p. 37].

Linguo-cultural approach considers language as a carrier of culture (V.A. Maslova, Y.S. Stepanov). The study of culture involves the inclusion of background knowledge about the personality of a native speaker, acting as an object of studying cultural specifics into the context of teaching. This focuses on the understanding and development of a certain students' behavior. Cultural background knowledge can be considered as the basis for the development of students' intercultural competence. Modeling of the intercultural communication aims to use the language in various situations that are close to natural. The learner is required to present himself in a particular role. This makes it possible to "compare the sociocultural background and the communicative style of behavior in the native and foreign language culture (cultural and pragmatic knowledge)" [3, p. 4-6].

This approach reveals the cultural-oriented content of language and speech, the study of culture through language. In the context of teaching foreign languages, there are two ways of sub studying of the language and culture: purely philological (through a word and verbal complexes through explication of a system of national-cultural concepts), sociological (through the study of culturally-based essence of communication).

Communicative competence – possession of skills and abilities in different types of speech activity. Language (linguistic) competence – theoretical knowledge in the field of language. In general, in the methodology of teaching foreign and non-native languages, language competence refers to a set of specific skills and abilities in the language system, which includes the subject's speech experience and knowledge of languages.

N.A. Akhmetova, M.R. Kondubaeva, T.I. Kapitonova and L.V. Moskovkin, consider communicative competence as a complex multi-component education, which includes the following components of competence: linguistic (knowledge of phonetics, vocabulary and grammar, as well as the ability to use them in their productive speech and understand other people in speech);

sociolinguistic (ability to take into account the sociolinguistic context of the communicative act, the specifics of the situations of communication, the social status of the partner);

sociocultural (knowledge of the ethnocultural peculiarities of the country of the language being studied, the rules of speech and nonverbal behavior in typical situations and the ability to exercise one's speech behavior in accordance with this knowledge), in linguodidactism, the concepts of sociocultural competence are close to the repeatedly formulated notions of regional, linguistic, cultural, linguocultural and intercultural competences;

discursive (knowledge of the rules for constructing of a coherent oral or written message); strategic (ability to select and use the most effective strategies for solving various communicative tasks); subject (knowledge of subject information, which allows students to generate or recognize statements) [1, 101].

Linguoculturology focuses on a new system of cultural values which put forward by the new thinking, the modern life of society, to complete, objective information about the cultural life of the country.

The main unit of description for this approach is the linguoculture as a special complex unit that represents the dialectical unity of linguistic and extralinguistic (conceptual and subject) content and includes segments not only of a language (linguistic significance), but also of a culture (extra-linguistic cultural meaning), represented by an appropriate sign. In contrast to the word and the lexico-semantic version, the linguoculture represents both as a linguistic representation itself and an "extra-linguistic, cultural environment" (situation, reality)- a stable network of associations. Therefore, the word signal will inevitably be in a person who knows the language, not only the meanings (as a hint), but the entire totality of the "cultural halo". The ignorance of the "cultural halo" of the word leaves the recipient at the language level, does not allow penetrating into the deep network of cultural associations, i.e. in the meaning of the statement of the text as a reflection of the cultural phenomenon [4, p.47].

As can be seen, the structure of the linguaculture is more complex than the actual linguistic units. Here, the cultural-conceptual component is added to the usual components (sign-value) as an extra-linguistic content of the linguoculure. Language mark as one of the components of linguoculture, i.e. as its form, signals not only its "superficial", proper linguistic meaning, but also the "deep" content (meaning) as a fact (element) of culture. A lingoculturema can be represented in one word, as a phrase, or an entire text (an extract from it), widely known to native speakers.

In this approach, "acculturation" occurs through the "cultivation" of language units, which leads students in the direction from the meaning of "guessing" to knowing and incorporating the sign-subject into the network of cultural associations which is characteristic to a given nation. Thus, it becomes obvious that with this approach, where culture is included as an object of study, the presentation of the material is based on the principle "from a cultural unit" and not from a language unit [5, p. 99-102].

The ability to intercultural communication is the formation of secondary cognitive consciousness in students by mastering a foreign language, which can be achieved through linguacultural study of quite representative cultural fragments. In this case, with a linguacultural approach, culture becomes an object of knowledge, which responds to the psychological characteristics of the process of a foreign language learning in a language university, when the language is no longer recognized as an object of knowledge and becomes itself a means of obtaining information about the world.

As noted above in the linguacultural approach, the focus is based on the reflection in the language of a representative "piece" of national culture in the connection with specific cultural units found in foreign language discourse. Thus, it is advisable to present sociocultural information contained in language units or simply related to the discussed problem, in a systematic way, in blocks, organized by the topic. The choice of a culture fragment, the sphere of communication determines the course content. I.I. Khaleeva identifies four main macrospheres of communication, where a person interprets through consciousness and a language, real-life relationships in the world, accordingly, four macrospheres of language usage: the sphere of production activity is special speech; everyday life – colloquial

(everyday) speech; cultural studies – literary and scientific speech; social activity – journalistic speech (including newspaper, public, television speech, as well as the speech of other media) [11, p. 230].

Since the linguacultural approach includes a culture as an object of teaching a foreign language, the presentation of the material should be based on the principle "from a cultural unit" (linguacultural), and not from a language unit. In this approach, emphasis is placed on the point registration of certain cultural information, extracted from a certain language unit, and on the reflection in the language of a certain representative block of national culture in connection with the commented language (speech) units. The study of a specific fragment of a culture by the method "from culture" is carried out using the construction of a lingual-cultural field, understood as the hierarchical structure of a multitude of linguistic culture that has a common (invariant) meaning characterizing a specific cultural sphere. The predominantly field-based approach to the study of objects in the field of culture stems from the general nature of the field as a synthesizing unit. Thanks to this phenomenon of the external world, the gaps in the conceptual system are so imperceptible. For the purposes of teaching a foreign language and culture, the field system should include minimally sufficient, but necessary linguoculture, which characterizes the difference between the two cultures [5, p. 102-105].

The fiction texts record certain cultural norms, they are the source of cultural information. The artistic text as a source of cultural background knowledge can be presented in different forms, to bear the author's world outlook, picture or image of the world, the meaning of past and subsequent cultures.

Currently, there is no unambiguous and generally accepted definition of text in linguistics and linguodidactics. The existing text definitions reflect the various scope and content invested in this concept. The text is considered as a structure, message, sentence flow, speech unity, a multidimensional phenomenon, a secondary semiotic communicative system, an upper limit in the hierarchy of language units, a speech product, lengthy syntactic units, a sequence of utterances, a speech work, a product of speech activity, a product of a written language variant, result of language realization, the work of human cogitative activity, etc.

In the fiction text can be identified a) conceptual; b) contextual; c) the actual text or informative plan; d) language plan, including a combination of different language tools [10, p. 132]. All this together allows us to consider a fiction text as a dynamic system creating a model of a foreign language culture. Considering the text from this angle, it is possible to build a linguocultural paradigm.

Each fiction text is informative and is able to transform and generate messages (Yu.S. Stepanov). In the Fiction text, the national-specific picture of the world appears in the form of a cultural and pragmatic space: the world around us, the way of life, the stock of knowledge and the cultural foundation, representatives of a different linguistic and cultural community.

Thus, fiction texts are the source of cultural background knowledge. The principle of culturally related co-study of languages involves the isolation of cultural values and the comparison of the selected linguacultural correspondences. A cultural material for the selection of texts should have a practical orientation, contain tasks that develop the ability to interpret cultural information, be fascinating and relevant and has a cognitive character. Textbooks in a foreign language can be supplemented with illustrations, photographs, music, audio materials.

When teaching Russian as a foreign language, the teacher must adhere to the principle of communicative orientation, differentiation and integration, as well as the principle of taking into account the native language [9, p. 34-36].

Basically, in the classroom they use the textbook by N.A. Akhmetova "Practical syntax of the Russian language" [2].

In modern conditions it is important to teach the student to think creatively and freely navigate the cultural space of the native and foreign language culture. The personality must have not only the ability to intercultural communication, but also to the heuristic procedures of constant knowledge of new elements.

Theoretical analysis of the thematic literature allowed to determine the linguacultural approach as the most effective approach aimed at the formation and improvement of the skills and abilities of intercultural communication by studying a foreign language as a cultural phenomenon. Under this approach, along with the language, culture is the main content of education.

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FORMATION OF LIFE MEANING AND HEALTH AT THE FOUNDATION OF FUNCTIONAL EQUIVALENCE THEORY

Avilov O.V.

Federal state budget educational institution of higher education Southern-Ural State Medical University, Chelyabinsk, e-mail: avilveschun@gmail.com

At the foundation of functional equivalence theory it has been shown that the sense of an organism's function, meaning of life, condition of preserving health and remoting time of death is elimination of constantly-emerging imbalances that exist as early as at the stage of zygote. Human needs are development of imbalances of a different level of expression, caused by overflow of informational, physical, and chemical factors that is formed over the course of life, and these factors cannot be removed from an organism independently without a risk of structure disturbance. In order to liquidate imbalances it is necessary to find "channels" of establishing equivalence, they allow for transformation of overflow in informational, physical, and chemical components of life into functional and structural changes in an organism. Such processes, for example, as elimination or synthesis of certain substances, renewal of cellular composition, change in mass and volume of organs and tissues, change in motion and behavioral activity. Summary changes in informational, physical, and chemical factors after certain needs have been fulfilled are equal to such before the fulfilment. Only the proportion between the mentioned components of life activity processes changes. In case when temper of imbalance development exceeds temper of equivalence establishment stress develops that facilitates emergency formation of an adequate reply along different "channels" by an organism. At the same time, emotional stress can serve as an indicator of imbalance liquidation degree.

Keywords: theory of functional equivalence, needs, meaning of life, health, healthy lifestyle, emotional stress

In modern conditions one of the problems in establishing psychological comfort of a person is formation of meaning of life [9]. However, psychological comfort is unlikely to be achieved without establishment of a necessary level of health that requires formation of healthy lifestyle and presence of adequate medical activity [4]. The latter is achievable only in case of understanding the significance of health preservation. But, what is this meaning? The "New Encycloppaedic Dictionary" defines the meaning or sense as "internal logical content, significance of something, comprehended by mind; idea, essence, purpose, as well as end goal (value) of something (e.g. meaning of life, etc.)" [7]. At the same time, when speaking of self-actualized people, A.G. Maslow wrote: "… They… devote themselves to search for… value of existence – search for main eternal, underlying values that cannot be subordinated to any other, more important… These values… emerge as needs and behave accordingly… These are metaneeds" [6]. Thus, A.G. Maslow, on the one hand, established certain relations between needs, values, and meaning of life, and, on the other hand, he actually equaled meaning of life to metaneeds. In this regard the next step should be understanding of what needs are. There are many definitions of needs. For our theory most exact is definition by K.V. Sudakov [8], he wrote that needs are stable deviations of vital constants of an organism from the level that provides for its normal activity and create initial stimulus of activity in functional systems not only at physical-chemical basis, but also at informational foundation. While developing the idea by P.K. Anokhin that within lively systems initial and final link in information transition should be comparative, K.V. Sudakov wrote that within every link of a functional system one can find traits of a need and its fulfilment, in other words, certain equivalence. However, the abovementioned authors studied equivalence only within the limits of lively systems as a condition of transiting information from one link to another.

However, we suppose that informational, physical, and chemical impacts upon an organism should be equal to totality of the transformed within the organism and eliminated from the organism informational, physical, and chemical components of life activity. Thus, in our opinion, a need is development in imbalance of different expression degree, caused by an overflow of informational, physical, and chemical factors that emerges over the course of life and cannot be eliminated by the organism independently without the risk of structure disturbance. Fulfilment of needs is a search for "channels" of equivalence establishment, in other words, increased or decreased number of informational, physical, and chemical stimulus for elimination of this overflow. The final result of fulfilling needs is establishment of equivalency due to transformation of surplus in informational, physical, and chemical components of life activity into functional and structural changes in an organism. Such processes, for example, as elimination or synthesis of certain substances, renewal of cellular composition, change in mass and volume of organs and tissues, change in motor and behavioral activity. Process of equivalency establishment can happen gradually. These grades we can define as "system quantums" according to

K.V. Sudakov [8]. Thus, while establishing imbalance, even if we received something from the outside, we give away a part of us in form of metabolites, products of life activity, hormones, movements, emotions, thoughts, words, and dreams. At the same time totality of physical, chemical, and informational changes in an organism after the needs are fulfilled is equal to the same before the fulfilment. Only proportion between physical, chemical, and informational components of life processes changes. Formation and elimination of imbalances goes on continuously over the course of life. In our work on problem of adaptation [1] we pointed out that theoretic foundation of our ideas is, on the one hand, thermal dynamics of irreversible processes, as according to I. Prigozhin. On the other hand we have a statement by I.I. Yuzvishin on the fact that total amount of information (i) and entropy (s) of i-condition of space or its corresponding area that emerges in result of any process, is always constant. Estimations by I.I. Yuzvishin prove that heat, work, and energy are forms (methods) of displaying (transiting) information. In this regard, from the position of our theory, imbalance emerges as early as at the stage of zygote and is defined by initial level of imbalance. The sense of an organism formation is, in our opinion, establishment of balance. Gradual process of forming equivalency allows us to slow the process of approaching complete balance – death. Elimination of imbalances without consequence for vital processes is possible only in amount pace, mostly defined by genetic features of an organism [3]. Generally, the meaning of our life and sense of forming a healthy lifestyle is timely elimination of imbalances at optimal pace in order to remote the time of death. At the same time, we cannot lower the degree of inborn imbalance. It is in our power only to limit it by establishing equivalency in timely manner. The pace of establishing equivalency, according to our theory, is highest with human embryo. As an organism ages, pace of equivalency establishment slows down. V.M. Dilman [5] wrote; "…When growth stops, the ongoing changes in physiological parameters that define condition of energetic, adaptive, and reproduction systems, no longer reflect dynamics of age norm, but the degree of oscillation from it, as rate of death, caused by major diseases is at lowest when these physiological parameters correspond to the level, typical for age of 20-25." We suppose this statement confirms our opinion on the fact that an optimal pace of equivalency establishment, particularly defined by abilities of an organism, achieved by the age of 20-25, provides for minimization of potential costs for a specific person, thus supporting the best possible conditions for life and health. At the same time we suppose that the role of mind in process of forming and eliminating imbalances, should be outlined. On the one hand, through concentrating an individual's attention upon significant, in their opinion, problems and goals, our mind can strengthen informational consequences of vital processes, in other words, degree of imbalance development. On the other hand, a person can consciously avoid situations that increase individual unequivalence and, especially in case of preparation, find "channels" of equivalency establishment quickly. To preserve health, from our point of view, it is important to realize if the formed needs (imbalances) are actually necessary for a person or no. We should underline that needs are formed with embryo in mother's womb. After birth further development of system of needs takes place at both unconscious and conscious level. In process of upbringing within family and educational institutions of different levels, an individual obtains skills of eliminating the emerging imbalances through the formed "channels" of equivalency establishment. Modern society, interested in creation of a "qualified consumer" forms additional imbalances that are often unnecessary, within a person via means of mass media. At the same time, advertisement imposes "channels" of eliminating artificially-created imbalances through purchase of goods and services. As a result, development of economy through growth in sales volume can lead to degradation in population health and shorten its lifespan. Besides, constant participation in race of consumerism can keep a person from realizing and fulfilling metaneeds by A.G. Maslow [6], as well as finding their meaning of life. Conscious and unconscious formation of imbalances happens together with formation of certain hierarchical order of such imbalances. But, a person's abilities to eliminate these imbalances is limited by a person's health level on the whole as well as by specific system (organ), within which pace of equivalency establishment cannot exceed (not without structural consequences) minimal, in comparison to other organs and systems, value ("weak" link of an organism). A person, in our point of view, should constantly consider if elimination of certain imbalances (achievement of goals, often false ones) is worth risking their health, know and account for "weak" links in their organism.

How can an individual understand that needs are not fulfilled, and meaning of life is not found? To answer this question we should address the problem of stress from the

position of theory of functional systems in which a subject cannot fulfil their needs [8]. But, according to the theory of functional equivalency, an outlook of causes of stress can be different. The sense of stress reaction, in our opinion, is a response to situation when pace of imbalance development due to impact or sudden lack of impact of informational, physical, or chemical factors exceeds pace of establishin equivalency. In such case happens an effort of emergency equivalent response along different "channels". As a result, change in function of practically all systems of an organism takes place. However, since an organism reacts in emergency, stress in this phase of its development happens along with a considerable disintegration in work of functional systems [8] and negative emotions. Such type of stress that is also called acute, emerges when imbalance is expressed significantly and formed suddenly, for example, in effort to survive in a fire. In case an imbalance exists for a long period of time, in order to find "channels" of establishing equivalency in an organism chronic emotional stress is developed. In our opinion, its displays at the background of negative emotions can be described as condition of frustration, suspense, cognitive dissonance. If we are studying imbalances, related to efforts of fulfilling metaneeds of find meaning of life, we can speak of "existence vacuum" according to V. Frankl [10], or even remorse. We suppose that continuous lack of eliminating imbalances via establishing equivalency leads to such consequences as syndrome of emotional burn-out, syndrome of chronic exhaustion, neurosis, psychosomatic diseases, and finally, lifespan shortening. However, the needs can be fulfilled, and the meaning of life can be found. In case of establishing complete equivalency positive emotions are formed within a person, and transition from disorganization to correspondence in work of functional systems happens [8]. A sign of high-level imbalance elimination can be discovery of creative values by a person, as well as values of experience, and values of relationship according to V.Frankl [10], and also their self-actualization. V. Frankl [10, p. 58]. Also wrote: "… Like happiness, self-actualization is only a result, consequence of realizing the meaning of life". Another example of establishing complete equivalency can be catharsis as a result of finalizing unfinished situations [2].

Thus. Life always has a meaning, regardless of if a person realizes it or not. The meaning can form at unconscious or conscious level. While working on determining the meaning of life, within process of psychological of psychotherapeutic assistance, one should first of all evaluate indexes of lack of fulfilment of needs and the formed meaning of life. While estimating hierarchy of imbalances for a certain patient, it is necessary to reveal the most expressed ones, and also find ways to eliminate a imbalance. At the same time a patient should understand if their imbalances reflect their own unrealized interests and intentions, or they are created by someone else in order to use the person in their own interest (elimination of imbalance). According to principles of dominancy [8], in process of eliminating the most significant artificially-created imbalances a person tends to neglect natural imbalances, related to vital processes. A cost of such behavior can be diseases. The sense of health lies in the idea that when balance is being established at an optimal pace, and no risk of structural changes in an organism, a person will experience positive emotions more often, and more like to achieve self-actualization, realize their meaning of life. Explaining the sense of health to people is, in our opinion, the foundation in forming a healthy lifestyle. Components of healthy lifestyle programme can be presented as "channels" of establishing equivalency.

Thus, theory of functional equivalency, in our opinion, allows us to make work upon formation of the meaning of life as well as healthy lifestyle more conscious and efficient.

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ARTIFICIAL INTELLIGENCE – TODAY AND TOMORROW

Ivanko A.F., Ivanko M.A., Timoshina A.D.
Moscow Polytechnic Institute, Moscow, e-mail: alekfed@mail.ru

Artificial intelligence exists and actively enters into our reality. We investigated this component of our life, examined the question of what artificial intelligence is, the history of its invention, the principles of its operation and its application in various areas of life, in particular, on public transport. Such components of artificial intelligence as machine learning, deep learning, neural network, cognitive computations and computer vision are revealed. The main question is: how can you make the movement of people over land, water and air more comfortable and safe using artificial intelligence technologies? At the moment, artificial intelligence is being successfully implemented in almost all types of transport: cars, buses, trams, metro, railway transport, airplanes, drones and ships. Companies around the world are working on new models of unmanned vehicles. Tests are conducted both in Russia and abroad. Countries seek to use the power of artificial intelligence as much as possible, creating whole smart cities with intelligent transport systems. There are new applications for land transport passengers and ridesharing fans. Such attention to the field of artificial intelligence due to such advantages of its use, as the absence of traffic jams and accidents on the roads, increased comfort of movement.

Keywords: artificial intelligence, neural network, training, technologies, applications, public transport, smart cars, smart buses, intelligent transport system

Artificial Intelligence (AI) is a concept that combines processes aimed at creating machines with intelligence, with the result that these machines can imitate human thinking. The main task of AI is to develop the functions of machines that are characteristic of human intelligence, such as learning, self-improvement and the ability to reason. That is, the main goal is not the automation of manual labor, but the execution of many large-scale computerized tasks.

The science of artificial intelligence is based on a number of disciplines: computer science, biology, psychology, linguistics, mathematics and engineering. Intellectual system – a system that can solve creative problems from a specific subject area. Knowledge of this area is stored in system memory. Another definition: it is an automated system based on knowledge, or a complex of software, linguistic and logical-mathematical tools for the implementation of the main task – the implementation of support for human activities and information retrieval in the advanced dialogue mode in natural language [2, p. 7].

Machine learning

Machine learning is a process in which machines learn and improve on the basis of experience. This process does not need to be programmed specifically for each action. Advanced technologies use algorithms that find patterns and generate ideas from data in order to make predictions and decisions in the future.

Also machine learning is:

1. the way to solve practical problems.
2. a way to increase the efficiency of computers.

Machine learning is used in health care, pharmaceuticals, diagnosis of diseases, rapid development of drugs, as well as in manufacturing and logistics. For example, Rethink Robotics uses machine learning to train manipulators and increase production speed. And in JaybridgeRobotics automate industrial-grade industrial vehicles for more efficient operation.

Deep learning

Deep learning is a machine learning method that uses artificial neural networks that learn by processing data. Such neural networks mimic biological neural networks in the human brain.

Several layers of artificial neural networks work together to find a way out of a variety of input data. (For example, see that the mosaic is folded into a picture).

For learning neural networks, including deep ones, the error backpropagation algorithm is used. In a deep neural network with several hidden layers, an error is calculated, which is transmitted from one layer to another. At the first stage, the error value is calculated at the output of the neural network, for which we know the correct answers. Then an error is calculated at the entrance to the output network layer, which will be used as an error at the output of the hidden layer. The calculation continues until the error is known on the input layer. That is why this algorithm is called an error backpropagation algorithm. [4, p. 31].

Thus, machines learn through positive and negative applications during problem solving. Self-study is the most advanced area of AI, thanks to which machines can make decisions, learn and think like people.

Neural networks

Deep learning is possible thanks to neural networks. Neural networks are computer systems modeled like neural connections in the

human brain. The artificial equivalent of a human neuron is the perceptron. Just as bundles of neurons create neural networks in the brain, perceptrons create artificial neural networks in computer systems.

Neural networks learn by processing examples. The best examples of training are presented in the form of large data sets, such as, for example, a set of 1000 photographs of cats. By processing multiple images (input data), the machine is capable of producing one output signal, answering the question "Is the image a cat or not?"

It is possible to characterize neural networks by the types of neurons used in the network, the structure of the network model, the methods of training the network and the tasks that the network solves.

According to the structure of connections, neural networks are [5, p. 2]:

1. Full-connected neural networks in which each neuron transmits its output signal to the rest of the neurons, including itself. All input signals are given to all neurons. The output signals of the network can be all or some of the output signals of neurons after several cycles of network operation.

2. Incomplete neural networks (usually called perceptrons) are divided into single-layer (simplest perceptrons) and multilayered, with direct, cross-sectional and feedback connections.

Cognitive computing

Cognitive computing is another important component of AI. His goal is to make the interaction between people and machines more productive. Cognitive calculations recreate the human thought process in a computer model. Estimation of mood is one of the main tasks of cognitive computations, since in order to fully understand the context and nuances of the human language, it is necessary to process words in their deepest linguistic meaning. Does cognitive computing have something in common with AI? They are similar, but artificial intelligence does not imitate human thought processes. AI provides the best algorithms for solving a particular problem. Cognitive calculations do not make decisions for people, but rather complement them.

Due to certain behavior and the ability to process information, cognitive calculations along with AI make the machine look like a person.

Natural Language Processing (NLP)

Natural language processing allows computers to interpret, recognize and reproduce human language and speech. The ultimate goal of NLP is to ensure uninterrupted interaction with the machines that we use every day. With the help of NLP, they learn to understand human language in context and to respond correctly to commands.

As an example – Skype Translator, which interprets speech in several languages in real time.

Computer Vision

Computer vision is a method that recognizes patterns for interpreting image content, including graphs, tables, PDF documents, as well as text and video. Thanks to this method is carried out deep learning. And machines can identify, process and interpret visual data.

There are many examples of using computer vision. For example, Tesla cars: they depend on a large number of cameras and on the sonar, which does not allow the car to stray from the route, and also fixes objects and vehicles around. Depending on innovation, computer vision helps in diagnosing, analyzing X-rays, MRI, CT and mammography, since almost 90 % of all medical data is based on images.

The history of AI

During the Second World War, the famous British scientist Alan Turing worked on hacking the Enigma code, which German forces used to send secret messages. Turing and his team invented the Bombe machine, which was used to decipher Enigma messages. The Enigma and Bombe machines laid the foundations for machine learning.

In 1950, Alan Turing published an article "Computing Machines and Mind", where he described the essence of the test, which later became known as the "Turing Test". This test was to establish whether the machine is able to think like a human being. If a machine communicates with people, and they think that this is a living person, and not a machine, then it can be considered "thinking".

In 1952, Alan Lloyd Hodgkin and Andrew Huxley developed a mathematical model of the brain that demonstrated the generation and distribution of action potentials in neurons and other electrically excitable cells. For the discovery of the authors received the Nobel Prize. It was a great contribution to the development of medicine and physiology.

In the 50s, an American scientist, John McCarthy, known as the father of AI, developed the LISP programming language, which was a significant discovery for the further development of machine learning.

In 1956, McCarthy organized the Dartmouth Conference, where the term "artificial intelligence" was officially adopted. In America, there were research centers to study the potential of AI.

In the 1960s, scientists sought to develop algorithms for solving mathematical problems and geometric theorems. In the late 1960s, work began on vision learning, in robots they began to develop the ability to machine learning. In 1972, WABOT-1, the first thinking humanoid robot, was built in Japan.

AI Winters

Despite the fact that the study of AI was well funded for several decades, scientists faced difficulties in creating machines with intelligence. AI programs (for example, vision learning) were supposed to process a huge amount of data, but computers were not powerful enough for this. Governments and corporations began to doubt the success of such research.

Therefore, from the mid-1970s to the mid-1990s, scientists faced an acute shortage of funding. These years are known as AI Winters. The time span between 1974 and 1980 is "The First AI Winter". It ended with the emergence of expert systems that were quickly developed and implemented by corporations around the world. The second AI Winter lasted from 1987 to 1993.

New methods-new features

In the late 1990s, American corporations again became interested in AI. The Japanese government announced plans to develop a fifth-generation computer to promote machine learning. AI enthusiasts believed that cars would soon be able to negotiate, translate from different languages, recognize images and think like people. In 1997, IBM Deep Blue came forward thanks to its first computer, which defeated the current world chess champion Garry Kasparov.

AI funding dried up when the dot-com bubble burst in the early 2000s. Nevertheless, machine learning continued to develop, mainly due to the improvement of computer equipment. Corporations have successfully used methods of machine learning in various fields.

The growth of computing power in the field of AI allowed companies to store a huge amount of data. For the past 15 years, Amazon, Google, Baidu, and other companies have used AI for commercial purposes. Now machine learning is used by many online services that we work with every day.

Spheres and methods of use

AI in public transport.

And in megacities, and in small towns, public transport is an important part of people's lives. Passengers who frequently use buses, subways, trolley buses and trams would like their daily trips to be as comfortable and safe as possible. To achieve this goal, municipal transport services use artificial intelligence technology. They help regulate traffic flows, monitor bus routes and ensure comfortable transportation of passengers to their destinations.

Advantages of AI systems for public transport.

Today, AI helps automate and optimize different processes of transport systems. For example, analyzing data on traffic congestion, AI can make recommendations on changing the route, control traffic lights, reduce traffic jams, analyze passenger traffic and monitor the condition of vehicles.

Various companies are developing smart buses equipped with artificial intelligence systems. Such machines use modern equipment and software that provide increased comfort and safety for passengers.

Intelligent systems help:

1. improve passenger service
2. make travel safer
3. optimize routes
4. reduce the number of accidents and car breakdowns
5. monitor passenger traffic and monitor fleets for carriers

Another advantage of cars with artificial intelligence systems is that most often they are cars that run on electricity. And it is much better for the environment and ecology.

Autonomous vehicles.

According to the World Health Organization, more than 1 million people die in a car accident every year. Accidents often occur for reasons of inattention on the roads, speeding and lack of driving experience.

Cars equipped with artificial intelligence, differ from traditional cars with computer control. To date, a number of leading firms are working on creating an autopilot for the car. It is assumed that such an autopilot must be equipped with a set of special sensors. They control everything that happens within a radius of 4–5 meters from a moving car. In addition, a camera and a radar are installed in its front. On board there is a GPS module. Information from sensors is processed by a computer system that recreates the big picture, analyzes it and issues signals to drive vehicles. Modern management systems are capable of self-learning and as a result are constantly improving themselves. [12, p. 2].

Cars with AI can drive independently, choosing a route depending on road conditions, weather and time of day. Cars without a driver do not get tired and do not lose concentration. Manufacturers claim that they are safe for passengers.

Today, smart cars are developed, tested and tested in Russia, USA, Sweden and other countries.

In addition, there is autonomous underground transport. Autonomous metro trains that travel without drivers are used in Paris, Istanbul, Dubai and other cities. In Moscow, in the next five years, it is planned to launch trains without a driver on the Koltsevaya metro line.

Artificial intelligence is the experience of Russia.

Autonomous electric car Shuttle, designed for 12 passengers, was introduced in 2016. It was developed by the State Scientific Center of the Russian Federation NAMI with the support of Yandex and KAMAZ. The car is equipped with video surveillance cameras and various sensors and can independently navigate the route to the destination.

In 2019, Cognitive Technologies and PC Transport Systems plan to launch a streetcar in Moscow without a driver. The tram was designed according to the Vityaz-M model and equipped with an automatic control system. The driver will be in the cab, ready to take control of the vehicle in the event of a dangerous situation on the road.

Automated systems for smart buses

Along with the development of autonomous buses, various companies produce automated systems that help organize the efficient operation of intelligent vehicles.

For example, the Russian company Euromobile has developed an integrated IT system for public transport. He sends data about the location of buses in the park, recording on the video camera everything that happens inside and outside. The fuel and tire pressure monitoring systems collect information about the condition of the car and also send it to the server. Voice auto informer informs passengers about the stops. In case of emergency, the ERA-GLONASS system sends the location of the bus to the park.

Another Euromobile project is the Auto-Conductor automated system. It registers the number of passengers transported by bus. Video cameras installed inside the bus track how many people get on the bus and get out of it. Data is transmitted to the central control station.

Artificial intelligence in air traffic

Airline AI technologies help passengers choose their flight directions and tickets. Thanks to these technologies, people do not need to go to the airport to clarify something. The AI system (for example, chat bot) can independently answer questions.

Google uses AI technologies in the "Flights" service, designed to track and book air tickets. Special algorithms are able to predict flight delays before the airline reports them.

Aviation-Russian experience

S7 Airlines, a Russian airline, uses artificial intelligence technology to help passengers choose their tickets. In the Facebook Messenger application, a chat bot informs customers about flight status and available air tickets. In addition, he can even choose a city for travel based on key queries.

Aeroflot is going to use AI to predict ticket prices and demand for regional routes. Thus, the airline will be able to avoid losses when entering new markets.

Drones

The goal of the European Urban Mobility Commission is to introduce unmanned aerial vehicles – drones. This is necessary for the delivery of goods (and theoretically – passengers) to various institutions. UAV drones would be the solution to all problems arising in transportation due to the human factor. Vasilis Aguridas, leader of Urban Air Mobility, said: "Over all modes of transport, including aviation, which is the safest mode of transport, intensive work is underway to further improve security by eliminating errors due to human factors and using new technologies such as artificial intelligence, machine learning and advanced sensors".

Autonomous ships

AI has captured not only ground transportation: it is currently in the development of remote-controlled vessels, which Rolls-Royce plans to launch by 2020. The crew of such a vessel will be on land, which involves reducing the risk of harm to workers and more space on board for the transport of goods. The main problem faced by developers, as indicated in the official Rolls-Royce document, is the risk of software hacking and ship redirection.

AI for traffic monitoring

Today you do not need to freeze on the street, waiting for your bus or trolley. You can

use a mobile application or online service to find out when the desired transport will arrive at the bus stop.

For example, the Trafi app shows real-time public transport and routes to destinations in Madrid, Riga, Tallinn, Rio de Janeiro, São Paulo, Jakarta, Istanbul and other cities. The service works even without an internet connection.

The inhabitants of Saratov, Balashov and Engels have a transport service Smart. This is an interactive map showing public transport routes. The portal allows users to find out when the bus comes to a particular stop.

At the same time, tests of the "Transport 45" service began in the Kurgan Region. Passengers can choose a stop, plan a route and find out the schedule of long-distance trips. The application also allows you to monitor the movement of vehicles. Similar services are available in other cities of Russia.

Intelligent Transport System

The Intelligent Transport System is an intelligent system that helps regulate traffic flows. It aims to improve highway safety and improve public services.

Munich launched the transport management system in 1991. Intelligent transport systems also operate in other major cities: London, Bristol, Brussels, Lyon and Toulouse. They regulate car traffic in tunnels, on ring roads and on strategic sites; Help you control parking and choose routes to bypass RTA zones.

AI in China

The Chinese company Didi Chuxing is the world's largest ridesharing company ((English ride "trip" + English share "share") – joint trips by car, whose participants share expenses among themselves; they are looking for a car in online applications). Didi Chuxing strive to be the first in the world and make a revolutionary contribution to the field of transport and automotive. Company President Jean Liu focuses on the globalization of a $ 56 billion conglomerate. In China, the company has 550 million registered customers in more than 400 cities and makes 30 million trips per day, but within the framework of partnerships it covers Australia, Brazil, Japan and Mexico, as well as Southeast Asia, India, Europe and Africa.

Didi Chuxing makes a huge investment in AI technology.

Working daily with a huge amount of data, Didi occupied an important place in this business: they have the opportunity to optimize navigation routes using AI technology. The company launched Didi Smart Transportation Brain, which combines data from Didi car cameras and sensors with data from the government and other partners. The company's goal is to create a system of management of urban traffic based on artificial intelligence and cloud technologies. Ultimately, this should lead to the creation of smart traffic lights and monitoring systems that can be used in any metropolis with traffic congestion.

Didi also use augmented reality applications that help passengers get to the location of the vehicle. The cars use a digital assistant that is activated by voice and offers a wide range of services, including audio and video content, as well as places for refueling, charging and repair.

Smart rails.

High-speed rail, launched in the Chinzhou district of China in 2017, is a train that runs without rails. Instead, he uses pneumatic tires and rides on a special marking that paves the route. Sensors embedded in the train recognize this marking and force the train to move along it, as if on rails.

Trains that transport cargo and passengers using AI and machine learning have been tested in other countries.

Moscow-transport systems

Moscow has been using the transport system since 2011. She combined signal lights, detectors and surveillance cameras. Their data are sent to the Traffic Management Center. This information is used to make short-term and strategic forecasts and, therefore, to monitor the traffic situation.

Now the intelligent transport system is functioning in such a way that detectors and cameras help fix traffic jams. With this information, artificial intelligence determines how long a green or red light should shine.

Also, electronic displays are placed on urban highways. They show information about traffic jams, weather and estimated travel time to a certain place. Operators provide integrated intelligent system operation. They track cameras, inform police about traffic accidents and respond to driver requests.

Thanks to the integration of the intellectual transport system, according to the Moscow government, the average speed of traffic in the city increased by 12-13 %.

AI training in the field of transport and not only.

In 2018, a free educational system appeared in Finland, the purpose of which was to teach the basics of artificial intelligence to at least 1 % of the 5.5 million people in the country. Universities and enterprises wishing to improve the

qualifications of their employees support the AI Challenge, which was launched in 2017 as a free online course. It became popular because its creators worked to make AI training accessible to a wider audience. Finland intends to become a world leader in the practical application of AI and plans to establish partnerships with its neighbors, Estonia and Sweden, to conduct tests on the use of AI in transport, cross-border transportation and infrastructure.

Perspectives

Now artificial intelligence can easily cope with tasks that previously were only possible for man. Cars on autopilot can drive independently, choosing a route depending on road conditions, weather and time of day. Such cars do not get tired, do not lose concentration and do not go astray, which is why they are safe for passengers. Artificial intelligence helps to automate and optimize various processes of transport systems. Analyzing data on traffic congestion, intelligent transport systems can make recommendations for changing the route, control traffic lights, reduce traffic jams, analyze passenger traffic and monitor the condition of vehicles. Airline AI technologies help passengers choose their flight directions and tickets. In Europe, they are working to introduce special drones to deliver goods and passengers to various institutions. Remote controlled vessels are being developed that can operate without crew on board. All these achievements show that artificial intelligence has a great future. And, if you correctly use the full potential of AI, then we can make our life much more comfortable, safe and environmentally friendly.

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COMPUTER NETWORKS IN THE WORK OF HIGH SCHOOL TEACHERS

Ivanko A.F., Ivanko M.A., Vinokur A.I.
Moscow Polytechnic Institute, Moscow, e-mail: alekfed@mail.ru

One of the most urgent problems of the development of the educational process is the formation of educational networks. The modern goal of the state policy of education is, first of all, increasing the accessibility of quality education, corresponding to the current needs of society and every citizen, in the concept of long-term socio-economic development of the Russian Federation for the period until 2020. On the basis of this, let us outline the following principles for the implementation of network interaction: Information technology, which will allow higher education institutions to develop more rapidly. Partnership and cooperation, allowing the exchange of developments and new materials. Development and implementation of joint programs. Networks in the educational process can be represented: as a set of interacting educational institutions, and technology for communication between teachers of various levels of training. To date, only a few higher education institutions have joint training programs for bachelors, specialists and masters. There are several problems in the implementation of network interaction, which are discussed in the article: A small work experience of teachers in the field of information technology; Lack of knowledge on the use of Internet resources in the educational process; Insufficient formation of professional competencies. The article examines examples of network interaction between teachers of higher educational institutions, as well as problems of networked pedagogical interaction.

Keywords: computer networks, network interaction, higher education , information technologies, educational process

Pedagogical interaction is a universal characteristic of the pedagogical process. Even without experience in the pedagogical sphere, you can clearly see several forms of pedagogical interaction: "student-student", "student-collective", "student-teacher", "students – the object of assimilation", etc. The main thing in this diversity is the relationship "pedagogical activity – student activities". But ultimately determining is the attitude of "student – the object of assimilation". This is the very specific nature of pedagogical tasks.

The pedagogical process expresses the interaction of two subjects, mediated by the object of assimilation, i.e. content of education.

From the scientific point of view, we distinguish such types of pedagogical interaction as: pedagogical (the relations of teachers and students); mutual (relations with teachers, peers, juniors); subject (the relationship of students with objects of material culture); relations to oneself.

Pedagogical interactions can differ among themselves. For example, direct and indirect effects. No less diverse and the response to these effects. For example, ignoring, ecstasy, indifference, acceptance of information, processing, memorization, action, etc.

Network pedagogical interaction

Informatization, widespread use of information technology in everyday life has an impact on education in the Russian Federation. These criteria became a condition for fulfilling the state order for the development of education.

GEF 4 th generation forms a request for the renewal of the information and educational environment of higher education and for the qualitative use of its resources, which is unrealistic without the development of the professionalism of VET teachers.

What is network interaction?

The teacher's network interaction is a technology that makes it possible to realize the opportunities for developing the teacher's competence through the activation of his personal characteristics, interests and opportunities.

What are the goals of networking between teachers?

They are quite understandable to any person, because in the age of information technology, every third qualified employee deals with a computer.

The objectives of networking are: to increase the level of professional knowledge of teachers, the practical development of innovative methods and technologies of the educational process, and, consequently, to improve the effectiveness of the pedagogical process.

Of course, the teacher can not be immediately ready for network interaction. This process goes through several stages:

1. Introduction and study of network services (software that handle different types of information).
2. Introduction of network technologies in the educational process (the introduction of projectors, electronic diaries, performance matrix, etc.).
3. Use of networks as an environment for the exchange of information between teachers.
4. Formation of own network service (teacher's website).
5. Use of personal information space (transfer of experience in network groups).

One can note the advantages of network interaction between teachers.

First, networked pedagogical interaction does not limit or establish a temporary, territorial framework for participants in the process. Teachers of different regions, and different countries, without obstacles can "cross" thousands of kilometers in just 1 second. And most importantly, it's availability!

Secondly, networked pedagogical interaction is focused on the individual needs of each teacher. This can be the transfer and acquisition of experience, participation in scientific webinars, online training, etc.

Thirdly, it is economy. Reducing the cost of transportation costs for going to the training centers.

Thus, network communities or teacher associations are a new form of professional activity organization available in a computer network. But, unfortunately, it was this effective innovation that was not sufficiently developed adequately among university professors. It is professional network associations that can give teachers the opportunity to communicate with each other, solve pedagogical issues, realize themselves and improve their professional level.

Network communities as a method of development of the educational process

An excellent option for continuous professional development, constant communication and exchange of knowledge with colleagues, presentation of their own experience are – network professional communities of teachers.

Teachers who participate in online communities acquire the skills to post information on the Internet, and also transmit and receive invaluable experience of their colleagues. All together, teachers create a semblance of an archive of methodological and didactic materials, which is necessary for the next generation of teachers and methodologists.

These groups have great advantages: space for information exchange between teachers, professional growth, incentive for creative development.

Examples of network pedagogical communities

So let's start with websites where university teachers can officially publish their works, articles, etc.

The first of such sites can be called the All-Russian site "For the Teacher" (https://dlyapedagoga.ru/). This is a web-based publication designed to publish author's developments of educators, teachers, teachers, as well as organizing and holding all-Russian competitions, quizzes and olympiads. The publication of the material on the website "For the teacher" is confirmed by the issuance of an electronic certificate, participation in an all-Russian event – an electronic diploma [1].

All-Russian site "For Teacher" allows teachers: participate in express competitions; publish articles; participate in conferences; publish reports; to pass distance learning; participate in webinars; create your own personal sites.

Also, the site divides all publications into preschool, primary, basic general, secondary (full), secondary (professional), higher and additional education. Such a structure allows teachers of any category to easily determine the direction of their activities, their potential competitors, etc.

The electronic educational journal "Teacher" (https://zhurnalpedagog.ru/) also has a number of advantages [2]. At first glance, this magazine in its structure is very similar to the All-Russian site "For the Teacher", but he also has differences.

Consider the differences:

1. The structure of the site also includes publications on pre-school, primary, basic general, secondary (full), secondary (professional), higher and additional education. But here one more item has been added – All-Russian conferences.

2. In the journal can be tested not only teachers, but also students with the curator.

3. If necessary, you can get a review of the work of the teacher.

4. The teacher can check the issued document on the website of the magazine "Teacher" on the series and number.

5. All the teachers who posted the publication on the website of the publication, or who participated in one of the events of the site, can download a letter of gratitude from the editorial staff. Is free!

6. The teacher can also take part in the expert activity.

All-Russian educational "Portal of the teacher" (https://portalpedagoga.ru/)[3].

This portal is also similar and almost exactly copies the previous one. Here teachers can also publish their articles, participate in online conferences, go through distance learning and refresher courses.

We examined three electronic platforms for VO teachers. Already now we can say that the All-Russian site "For the Teacher", and the Electronic Educational Journal "Teacher",

and the All-Russian Educational "Portal of the Teacher" have only paid publications.

Consider, as an example, several free sites for communication between teachers.

One of these sites is the Sotsobraz network community (http://wiki.iot.ru/index.php/) [4].

Networked social and pedagogical community created within the project "Creation and development of social and pedagogical communities in the Internet (teachers, methodologists, social educators, psychologists, specialists in additional education and parents). Here teachers can participate in consultations, in training, in educational developments, write an article. "SotsObraz" is an interactive platform for the exchange of experience of teachers, methodologists, social educators, class teachers, teachers of additional education, school psychologists, and the network community where parents can receive counseling and necessary recommendations on the issues of education, upbringing and development of schoolchildren.

Of course, there is no section for teachers of higher education institutions, but to raise their level of knowledge of pedagogical psychology, social pedagogy will not hurt the teacher of the university.

A professional community of teachers "Methodist.ru" (http://metodisty.ru/m/groups/home/)/5] will really help to feel the network pedagogical communication. It is designed to meet the needs of teachers precisely in the exchange of information, communication and self-realization. The site has a forum, the teacher can create a group, blog, chat. There is a library of teachers' works, where you can contribute your work. The community contains more than 30 groups (different subjects and directions – administration, class leaders, subject matter, etc.). Presentations, programs, development of lessons within each group. Everything can be downloaded! Each development contains an author's comment with a description. There is an opportunity to discuss work within the group, evaluate it or communicate with the author. Many audio and video files are freely available. You can publish your own materials, and even create a group. The advantage of this pedagogical community is that you do not have to register for downloading the material. In fact, even a student of a pedagogical higher educational institution can find a lot of useful information for himself.

Faculty "Education Reform" of the educational portal "My University". Club of teachers (http://edu-reforma.ru/index/0-23)[6]. Provides a platform for communication and exchange of experience, as well as extensive opportunities for all those who are engaged and interested in teaching children and reforming education. There is a dedicated subject (thematic focus) – for the experts of the contest "Active teaching methods".

A member of the Club can be any person who has fulfilled the conditions of joining the Club, which deals with teaching students or reforming education.

Conditions for joining the Club as a member:

1. It is necessary to accept the conditions of participation in the Club.
2. Follow the Club Rules
3. Fill in the application form for joining the Club

Opportunities for Club members:

1. The possibility of communication among professionals, involvement in the professional community.
2. The possibility of obtaining useful information on educational reform and pedagogy.
3. The possibility of finding partners for the development and implementation of their educational projects, the acquisition of useful links.
4. Help, professional advice of colleagues.

These are just a few examples of e-portals for teachers. That's just missing a highly specialized site for university teachers in a certain area.

Thus, in the Internet space there is a sufficient number of sites for communication and exchange of experience between teachers. Another question is whether university professors are ready to participate in the activities of these sites?

Peculiarities of network interaction of higher educational institutions

The development of the economy of the Russian Federation assumes the introduction of new organizational forms of interaction between domestic and foreign educational institutions, in particular, higher education institutions.

Not only network pedagogical communities, but also networked communities of higher educational institutions should undergo modernization.

It is not necessary to concentrate in education all attention on the vertical system of VO (bachelor's-master's degree-postgraduate study, specialty-postgraduate study). In the 21st century, it is necessary to provide an opportunity to expand the range of professional opportunities for students at the undergraduate

or specialist level (horizontal system). Now there are very few examples of a horizontal system for training future professionals. One such example is the USU project – joint programs for the preparation of bachelors in economics of the State University – Higher School of Economics (SU-HSE) and Ural State University (USU). Thus, students receive two diplomas of a bachelor's degree – a native university and a diploma of SU-HSE. This project is set up as an experiment, the inter-university agreement is the normative basis, which sets the conditions for the selection of students of the USU for simultaneous training at SU-HSE, as well as the mode, terms, and cost of training.

This example proves that now, in the ever-changing conditions of the Russian vocational education system, the trainee can be given opportunities to increase the mobility of his education.

But not only the student wins on the basis of a networked university association. The teacher also has the opportunity to upgrade his skills and expand his professional experience, through communication and consultation with other university teachers and staff.

The only drawback of the USU program is that the competences of graduates do not increase.

The solution to this shortcoming was the joint educational program for the preparation of bachelors of the Academy of National Economy under the Government of the Russian Federation (ANE) and the Moscow Institute of Physics and Technology (MIPT). Here the program is designed in such a way that students study the full course on economics at the Academy of National Economy and on one of the directions at MIPT. Among these directions, MIPT presented applied mathematics and physics, as well as systems analysis and management. At the exit, graduates receive two diplomas from MIPT and ANE.

As for the specific networked pedagogical interaction within several higher educational institutions, a striking example is the network association – "Pedagogical Staff of Russia". This association of educational institutions is created with the purpose of raising both pedagogical quality of teaching and increasing the activity of teaching staff in different regions of Russia.

It should be noted that this is the largest network of universities in Russia. This includes more than 19 state educational institutions of higher education of the Russian Federation. And almost all of them are located in different cities and regions of our country. The main objectives of the network association "Pedagogical cadres of Russia" include: providing a higher quality of professional training of teachers; joint preparation and implementation by teachers of different institutions of programs of higher, secondary and postgraduate education; creation of a clear system of training and retraining of qualified professional teaching staff; creation of a unified database of information resources of teachers; analysis and forecasting of the development of the modern market of pedagogical work (including for graduates); creation and development of interuniversity mobility of students and teachers; creation of a common educational space for higher educational institutions through the implementation of joint educational programs (exchange of teachers in different regions); organization of international cooperation; exchange of technology and teaching methods, etc.

Conclusions

On the basis of the conducted research it is evident that the network interaction of VO teachers is undoubtedly a positive factor in influencing the quality of the educational process. On how often the teacher will "update" his knowledge depends on the relevance of the knowledge of students currently.

In the 21st century, with constantly changing economic conditions, with an ever-changing information environment, first of all, it is necessary to understand the teacher of VO in this environment. After all, it is the quality of knowledge, the reliability of information transmitted to learners that will determine the future of not only graduates, but also of Russia as a whole. The general welfare of our country depends on the degree of qualification of the employee.

Computer networks, especially the Internet – the main source of information now! From this point of view, the teacher simply needs to have network communication with other educators.

The network interaction of teachers solves, perhaps, the most important problem of our country – the fast transfer of information over long distances. And since Russia occupies more than 17 million ???? the need for network communication is unambiguous.

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