RUSSIAN HYDROBIOLOGICAL SOCIETY AFFILIATED WITH RAS SCIENTIFIC COUNCIL ON STUDY, PROTECTION AND RATIONAL USE OF ANIMALS RAS "BIOGEN-ANALYTIKA", EQUIPMENT FOR LIFE SCIENCE RESEARCH...

Olga Isaeva
Kamchatka State Technical University

RUSSIAN ACADEMY OF SCIENCES
DEPARTMENT OF BIOLOGICAL SCIENCES RAS

INSTITUTE FOR BIOLOGY OF INLAND WATERS RAS

SCIENTIFIC COUNSIL OF HYDROBIOLOGY AND ICHTYOLOGY RAS

A.N. SEVERTSOV INSTITUTE OF ECOLOGY AND EVOLUTION RAS

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES

DEPARTMENT OF BIOLOGICAL RESOURCES OF U.S. GEOLOGICAL SERVICE (USGS)
U.S. FISH AND WILDLIFE SERVICE (US FWLS)
INTERNATIONAL SOCIETY OF ZOOLOGY SCIENCES (ISZS)
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"BIOGEN-ANALYTIKA", EQUIPMENT FOR LIFE SCIENCE RESEARCH

PROGRAMME & BOOK OF ABSTRACTS

IV INTERNATIONAL SYMPOSIUM “INVASION OF ALIEN SPECIES IN HOLARTIC” (BOROK-4)

September, 22-28th, 2013

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The IV International Symposium
INVASION OF ALIEN SPECIES IN HOLARCTIC
(BOROK – 4)

SYMPOSIUM AGENDA

Day 1: SEPTEMBER 22, 2013

Registration, Accommodation, Information

Day 2: SEPTEMBER 23, 2013

THE MAIN CONFERENCE HALL OF THE IBIW RAS

Session Chair: V.T. Komov

9^{00}–9^{20} Opening of the *IV International Symposium* ALIEN SPECIES IN HOLARCTIC (BOROK – 4)

Plenary session

9^{20} *Dgebuadze Yu.Yu., Dergunova N.N., Khlyap L.A., Petrosyan V.G.* RISK ASSESSMENT OF INVASION OF ALIEN SPECIES INTO EUROPEAN PART OF RUSSIA USING INFORMATION SYSTEMS

9^{45} *Feniova I.Yu., Razlutski V.I., Palash A.L., Tunowski J., Sysova E.A.* COMBINED EFFECTS OF FOOD ABUNDANCE AND TEMPERATURE ON LARGE BODIED VS SMALL BODIED CLADOCERAN SPECIES REPLACEMENT

10^{10} *Douglas M.E., Douglas M.R.* THE UTILITY OF SINGLE NUCLEOTIDE POLYMORPHISMS (SNPS) FOR IDENTIFICATION OF HYBRIDS AMONG NATIVE AND INVASIVE SUCKERS (PISCES: CATOSTOMIDAE) IN THE COLORADO RIVER ECOSYSTEM OF WESTERN NORTH AMERICA

10^{35} *Minchin Dan, Matej D., Gollasch S., Jelmert A., Olenin S.* THE COLD ROUTE: ALIEN BIOTA SPREAD VIA ARCTIC SEAS

Coffee break **11^{00}–11^{30}**

11^{30} *Narščius A., Olenin S.* BIO GEOGRAPHICAL REGIONS DEFINED BY AQUATIC NON INDIGENOUS SPECIES ASSEMBLAGES

11^{55} *Aleksandrov B.G.* NEW APPROACH TO SOLVE THE PROBLEM OF BIOLOGICAL INVASIONS

12^{20} *Zhibin Zhang, Xinhai Li, Chunxu Han* BIOLOGICAL CONSEQUENCES OF GLOBAL CHANGE

2^{45} *Novitskiy R.A.* TRANSFORMATION OF ICHTHYOCENOSIS OF NATURAL AND ARTIFICIAL WATER RESERVOIRS OF UKRAINE AS A RESULT OF INVASION OF ALIEN FISH SPECIES

Lunch break **13^{10}–15^{00}**

Session Chair: Yu. Yu. Dgebuadze

15^{00} *Reshetnikov A.N.* DEVELOPMENT OF THE RANGE OF THE INVASIVE FISH *PERCCOTTUS GLENII* IN EUROPE AND ITS IMPACT ON FRESHWATER ECOSYSTEMS

15^{25} *Shiganova T.A.* COMPARISON NATIVE AND NON-NATIVE BETA-DIVERSITY IN THE SEAS OF EURASIA AND FACTORS, WHICH DETERMINE THEM

15^{50} *SlynkoYu.V.* EVOLUTION-ECOLOGICAL ASPECTS OF BIOINVASION PROCESS

16^{15} *Pautova L.A., Abakumov A.I., Silkin V.A.* MECHANISM OF REGULATION OF INVASION IN MARINE PHYTOPLANKTON

16^{40} *Ivin V.V., Zvyagintsev A.Yu.* MONITORING OF ALIEN SPECIES IN MARINE AND INSULAR PROTECTED AREAS BY THE EXAMPLE OF THE FAR EAST MARINE BIOSPHERE RESERVE OF THE FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES

Coffee break **17^{05}–17^{35}**

17^{35} *Khlyap L.A.* CONTROL OF INVASIVE ALIEN MAMMALS POPULATIONS IN EUROPEAN RUSSIA

18^{00}*Petrosyan V.G., Golubkov V.V., Goryainova Z.I., Zavyalov N.A., Albov S.A., Khlyap L.A., Dgebuadze Y.Y.* QUASI-PERIODIC FLUCTUATIONS OF EUROPEAN BEAVERS (*Castor fiber* L.) ABUNDANCE IN THE PRIOKSKO-TERRASNY NATURE RESERVE

18^{25} *Maslyakov V.Ju.* BIOTIC INVASIONS SPECIES AS PROBLEM OF ECOLOGICAL AND ECONOMIC INTERACTIONS

19:30 Welcome supper

DAY 3: SEPTEMBER 24, 2013
Special Session

THE MAIN CONFERENCE HALL OF THE IBIW RAS

Invasions in freshwater ecosystems

Session Chair: L. G. Korneva

9^{00} *Babanazarova O.V., Sidelev S.I., Zubishina A.A.* ABOUT BLOOMING OF THE *CYLINDROSPERMOPSIS RACIBORSKII* AND APPEARANCE OF OTHER INVASIVE SPECIES (CYANOBACTERIA) IN PHYTOPLANKTON OF HIGHLY EUTROPHIC LAKE NERO (RUSSIA)

9^{15}*Alekseeva Ja.A., Andreeva A.P., Borovikova E.A., Gruzdeva M.A., Dvoryankin G.A., Kuzishchin K.V., Makhrov A.A., Novoselov A.P., Popov I.Yu.* FRESHWATER FISH FAUNA OF SOLOVETSKY ISLANDS (WHITE SEA): NATURAL COLONIZATION AND RECENT INTRODUCTIONS

9^{30} *Bashinskiy I.V.* IMPACT ASSESSMENT OF BEAVER REINTRODUCTION ON AMPHIBIANS OF SMALL RIVERS

9^{45} *Bayanov N.G.* OCCURRENCE AND ABUNDANCE LEVEL OF *KELLICOTTIA BOSTONIENSIS* (ROUSSELET, 1908) IN LAKES OF THE NIZHNIY NOVGOROD REGION

10^{00} *Borisova E.A.* WOODY PLANTS INVASIONS INTO THE UPPER VOLGA NATURAL COMMUNITIES

10^{15} *Boznak E.I., Rafikov R.R., Kulik L.E.* VARIABILITY OF MERISTIC CHARACTERS OF ALIEN FISH IN THE RESERVOIRS OF EUROPEAN NORTH EAST OF RUSSIA

10^{30} *Dukravets G.M.* ALIEN SPECIES IN KAZAKHSTAN ICHTHYOFAUNA

10^{45} *Hongxuan He* Expansion of an invasive freshwater snail *Physa acuta* (Gastropoda: Physidae) in China

Coffee break **11^{00}–11^{30}**

11^{30} *Filinova Ye.I.* INVASIVE SPECIES IN ZOOBENTHOS OF RESERVOIRS OF LOWER VOLGA

11^{45} *Filonenko I., Ivicheva K.* INVASION OF *GMELINOIDES FASCIATUS* (STEBB.) IN THE SHEKSNINSKOE RESERVOIR

12^{00} *Golovanov V.K.* TEMPERATURE ADAPTATIONS OF FRESHWATER FISH: ALIEN AND NATIVE SPECIES

12^{15} *Ivancheva E.Yu., Ivanchev V.P., Sarychev V.S.* DISTRIBUTION OF STONE MOROKO *PSEUDORASBORA PARVA* IN THE UPPER DON BASIN

12^{30} *Interesova E.A.* NON NATIVE FRESHWATER FISH SPECIES IN THE OB RIVER BASIN

12^{45} *Artamonova V.S., Karabanov D.P., Makhrov A.A.* GENETIC METHODS FOR THE CONTROL OF ALIEN SPECIES

Lunch break **13^{00}–15^{00}**

Session Chair: A. N. Reshetnikov

15^{00} *Isaeva O.M., Gadinov A.N., Zadelenov W.A., Wishegorodcev A.A.* ACCLIMATIZATION AND DISPERSE OF BREAM IN THE YENISEI RIVER BASIN

15^{15} *Karpova E.P., Boltachev A.R.* INVASIVE FISH SPECIES IN THE CRIMEAN WATER RESERVOIRS AND THEIR IMPACT ON THE NATIVE ICHTHYOFAUNA

15^{30} *Khudyi O., Khuda L.* THE DISTRIBUTION OF ALIEN FISH SPECIES IN THE WATERS OF NORTHERN BUKOVINA AND NORTHERN BESSARABIA (UKRAINE)

15^{45} *Kvach Y., Drobiniak O., Kutsokon Yu., Hoch I.* THE ORIGIN OF THE CHINESE SLEEPER *PERCCOTTUS GLENII* (ACTYNOPTERYGII: ODONTOBUTIDAE) POPULATION IN UKRAINE, BASED ON THE PARASITE FAUNA DATA

16^{00} *Kipriyanova L.M., Zarubina E.Yu.* INVASIVE AQUATIC MACROPHYTES IN WEST SIBERIA

16^{15} *Kozhabaeva E.B.* MODERN STATE OF ALIEN FISH IN THE SYRDARYA RIVER WATERSHED

16^{30} *Korneva L.G.* INVASIVE PLANKTIC ALGAE IN THE INLAND WATERBODIES: SCALES, CAUSES, CONSEQUENCES

Coffee break **16^{45}–17^{15}**

17^{10} *Kostitsyn V.G.* INVASIVE SPECIES IN THE ICHTHYOCENOSIS OF THE WESTERN URALS WATERS

17^{25} *Kurina E.M., Zinchenko T.D.* SIGNIFICANCE OF ALIEN SPECIES IN THE STRUCTURE OF MACROZOOBENTHOS COMMUNITY OF THE KUYBYSHEV AND SARATOV RESERVOIRS

17^{40} *Kustareva L.A.* ALIEN SPECIES IN THE FISH FAUNA OF KYRGYZSTAN

18^{25} *Loginov V.V., Klevakin A.A., Moreva O.A.* THE MORPHOLOGICAL CHARACTERISTIC OF NINE SPINED STICKLEBACK (*PUNGITIUS PUNGITIUS* LINNAEUS 1758) IN BASIN OF THE CHEBOKSARY RESERVOIR

DAY 3: SEPTEMBER 24, 2013

Special Session

THE SMALL CONFERENCE HALL OF THE IBIW RAS

Invasions in marine ecosystems

Session Chair: T.A. Shiganova

9^{30} *Boltachev A.R., Karpova E.P.* THE LAST INFORMATION ABOUT DISTRIBUTION OF NEW FISH SPECIES IN THE CRIMEAN COASTAL ZONE (BLACK SEA)

9^{45} *Grigoryev S.S., Sedova N.A.* WALLEYE POLLOCK *THERAGRA CHALCOGRAMMA* – THE INVADER IN NORTH PACIFIC

10^{00} *Gusev A.A., Rudinskaya L.V.* SHELL FORM AND GROWTH OF A NEW ALIEN SPECIES OF *RANGIA CUNEATA* (G.B. SOWERBY I, 1831) IN THE VISTULA LAGOON (BALTIC SEA)

10^{15} *Kamakin A.M.* THE SPATIOTEMPORAL DYNAMICS OF DISTRIBUTION OF POPULATION OF INVADER *MNEMIOPSIS LEIDYI* IN THE CASPIAN SEA

10^{30} *Selifonova Zh.P.* ALIEN SPECIES AT COASTAL WATERS OF THE NORTH-EASTERN BLACK SEA

10^{45} *Svistunova L.D.* INVASION AND DISTRIBUTION OF *OITHONA BREVICORNIS* GIESBRECHT, 1891 (COPEPODA: CYCLOPOIDA) IN THE SEA OF AZOV

Coffee break **11^{00}–11^{30}**

11^{30} *Ezhova E.E., Kocheshkova O.V., Polunina Ju.Ju.* NON INDIGENIOUS INVERTEBRATE FAUNA OF SOUTHEASTERN BALTIC: THE INVENTORY ANALYSIS OF COMPOSITION ABD FORMATION IN REGARD OF PECULARITIES OF AQUATIC SYSTEM

11^{45} *Ware C., Alsos I.G., Kirkpatrick J.B., Berge J., Sundet J.H., Jelmert A., Coutts A.D.M.* MEASURING AND MANAGING INVASIVE SPECIES THREATS IN HIGH-ARCTIC SVALBARD

12^{00} *Martemyanov V.I., Ezhova E.E.* ASSESSMENT OF STATUS OF INDIGENOUS AND INVASION SPECIES OF BIVALVE CLAMS IN RELATION TO SALINITY AT BASE OF OSMOTIC AND IONIC REGULATION PATTERNS

12^{15} *Maximov A.A.* ECOLOGICAL AND BIOGEOGRAPHICAL ASPECTS OF INVASION POLYCHAETES *MARENZELLERIA ARCTIA* TO THE BALTIC SEA

12^{30} *Abramenko M.I.* TRANSFORMATION OF GENETIC STRUCTURE OF SILVER CRUCIAN CARP *CARASSIUS AURATUS GIBELIO* (BLOCH, 1782) POPULATIONS FROM THE BASIN OF AZOV SEA

12^{45} *Semenova A.S., Dmitrieva O.A.* IMPACT OF INVASIVE SPECIES *RANGIA CUNEATA* (SOWERBY I, 1832) ON THE PLANKTON COMMUNITY OF THE VISTULA LAGOON (BALTIC SEA)

Lunch break **13^{00}–15^{00}**

Session Chair: B. G. Aleksandrov

15^{00} *Kamakin A.M., Katunin D.N., Zaitsev V.F.* BASIC ELEMENTS OF SIMULATION MODEL OF HYDROLOGICAL REGIME OF THE NORTHERN CASPIAN IN PREDICTING INVASION MNEMIOPSIS LEIDYI

15^{15} *Kamakin A.M., Paritskiy U.A., Nikulina L.V.* THE IMPACT OF INVADER MNEMIOPSIS LEIDYI ON ABORIGINAL FAUNA OF THE CASPIAN SEA

15^{30} *Karpinsky M.G.* RELATIONSHIP OF THREE MASS INVASIVE SPECIES IN THE CASPIAN

15^{45} *Kocheshkova O.V., Ezhova E.E.* DYNAMICS AND STAGES OF MARENZELLERIA NEGLECTA INVASION IN THE VISTULA LAGOON, BALTIC SEA – 25 YEARS OF NATURALISATION

16^{00} *Kreneva K.V.* INVASIVE SPECIES OF TINTINNIDS FROM THE SEA OF AZOV

16^{15} *Kurashov E.A., Malavin S.A., Panov V.E.* PROBLEM OF IDENTIFICATION AND EVALUATION OF CONSEQUENCES OF AQUATIC INVERTEBRATES INVASIONS IN THE WATER BODIES OF THE GULF OF FINLAND (BALTIC SEA) WATERSHED

16^{30} *Lange E., Ezhova E., Kocheshkova O.* ON FEEDING PECULARITIES OF *MARENZELLERIA NEGLECTA* (POLYCHAETA: SPIONIDAE) AND *RANGIA CUNEATA* (MOLLUSCA, BIVALVIA: MACTRIDAE) – INVASIVE BENTHIC SPECIES IN SHALLOW LAGOON ENVIROMNENT

Coffee break **16^{45}–17^{15}**

17^{10} *Pereladov M.V.* METHODOLOGICAL PROBLEMS OF ASSESSING THE IMPACT OF THE RED KING CRAB IN THE BARENTS SEA ECOSYSTEM

17^{25} *Semenova A.S.* INVASIVE SPECIES CERCOPAGIS PENGOI (OSTROUMOV, 1891) AND EVADNE ANONYX GO SARS, 1897 AND THEIR INFLUENCE ON THE STRUCTURE AND FUNCTIONING OF THE ZOOPLANKTON COMMUNITIES IN SOUTH EASTERN PART OF THE BALTIC SEA

17^{40} *Afanasev A.G.* “CellCelector” – FLEXIBLE DETECTION AND SELECTION OF CELLS AND COLONIES

DAY 4: SEPTEMBER 25, 2013

Special Session

THE MAIN CONFERENCE HALL OF THE IBIW RAS

Invasions in freshwater ecosystems

Session Chair: Yu. S. Reshetnikov

9^{00} *Borovikova E.A.* THE FEATURES OF COREGONID PALEOINVASIONS FOR CONTEMPORARY PATTERN OF THE COREGONID FAUNA OF THE NORTHERN RUSSIA

9^{15} *Kambulin V.E., Badayev E.A., Temreshev I.I., Kolov S.V.* THE PROBLEM OF EXTERNAL AND INTERNAL ALLIENS SPECIES IN KAZAKHSTAN

9^{30} *Mishvelov E.G., Oleynikov A.A.* NATURALIZATION OF CHANNEL CATFISH (ICTALURUS PUNCTATUS) IN THE WESTERN PART OF THE STAVROPOL TERRITORY

9^{45} *Popov A.I.* ALIEN SPECIES IN THE PELAGIC ZOOPLANKTON OF THE SARATOV RESERVOIR: INVASION, NATURALIZATION, PLACE IN THE ASSEMBLAGE

10^{00} *Popov I.Yu.* EUROPEAN ANCHOVY AND OTHER NEW FISH SPECIES IN THE WATER BODIES AROUND SAINT PETERSBURG

10^{15} *Pavlov D.F., Frontasieva M.V., Bezuidenhout J., Goryainova Z.I.* CONTENTS OF CHEMICAL ELEMENTS IN THE TISSUES OF NON INDIGENOUS SPECIES, MEDITERRANEAN MUSSELS AND PACIFIC OYSTERS IN THE SOUTH AFRICAN COASTAL WATERS: POTENTIAL IMPACT UPON WATER QUALITY AND IMPLICATIONS FOR ENVIRONMENTAL IMPACT ASSESSMENT

10^{30} *Sapargalieva N.* ICHTHYOFAUNA OF THE RIVER AKSU OF BALKHASH BASIN

10^{45} *Sasi Huseyin, Yabanli Murat* DISTRIBUTION OF INDIGENOUS AND INVASION FISHES IN DALAMAN RIVER IN THE MEDITERRENEAN REGION (MUGLA – TURKEY)

Coffee break **11^{00}–11^{30}**

11^{30} *Shemonaev E.V., Kirilenko E.V.* BIOLOGY OF THE AMUR SLEEPER PERCCOTTUS GLENII, DYBOWSKI, 1877 OF MORDOVINSKAYA FLOODPLAIN OF THE SARATOV RESERVOIR

11^{45} *Semenchenko V., Son M., Novitsky R., Panov V.* NON NATIVE MACROINVERTEBRATES AND FISHES OF THE DNIEPER RIVER BASIN

12^{00} *Sonina E.E. HYDRILLA VERTICILLATA* (L. FIL.) ROYLE IN THE VOLGOGRAD RESERVOIR

12^{15} *Tereshchenko V.G., Kubecka J., Jankovský M., Tereshchenko L.I.* INFLUENCE FISH SPECIES INTRODUCED ON DIVERSITY STRUCTURE OF THE FISH ASSAMBLEGE OF RESERVOIRS OF THE CZECH REPUBLIC

12^{30} *Vasina A.L.* ABOUT FINDS AND DISTRIBUTION OF BRINGING PLANTS IN AQUATIC AND SEMIAQUATIC TCENOSIS KONDO SOSVA ZAURALYE

12^{45} *Vekhov D.A.* POSSIBLE WAYS & MEANS OF SETTLEMENT OF GIBEL CARP IN WATERS OF EUROPEAN PART OF USSR

Lunch break **13^{00}–15^{00}**

Invasions in freshwater ecosystems; impact on native species and communities

Session Chair: D. F. Pavlov

15^{00} *Yadrenkina E.N.* THE ROLE OF ALIEN SPECIES IN THE FISH COMMUNITIES OF LAKES IN WESTERN SIBERIA

15^{15} *Zuev I.I., Yakovlev Yu.Yu.* THE FIRST FINDING OF AMUR SLEEPER *PERCCOTTUS GLENII* IN THE MIDDLE YENISEY BASIN

15^{30} *Zaiko A., Daunys D., Šiaulys A.* AQUATIC INVASIVE SPECIES AND BIOTIC INDICES: A FAKE EVIDENCE OF WATER QUALITY IMPROVEMENT?

15^{45} *Zarbaliyeva T.S., Nadirov S.N., Akhundov M.M.* IMPACTS OF INVASIVE SPECIES ON THE CASPIAN SEA FAUNA IN COASTAL WATERS OF AZERBAIJAN

16^{00} *Yabanlı M., Yozukmaz A., Sel F.* BIOACCUMULATION OF HEAVY METALS IN TISSUES OF THE GIBEL CARP *CARASSİUS GİBELİO*: EXAMPLE OF MARMARA LAKE, TURKEY

16^{15} *Popova O.A., Reshetnikov Yu.S., Amundsen P.* CHANGES OF "PREDATOR-PREY" RELATIONS IN THE PASVIK RIVER WATERBODIES AFTER THE VENDACE INVASION

16^{30} *Douglas M.R., Douglas M.E.* INTROGRESSIVE HYBRIDIZATION IN RIO GRANDE CUTTHROAT TROUT (*ONCORHYNCHUS CLARKI VIRGINIALIS*): ENVIRONMENTAL, GEOGRAPHIC, AND HISTORIC CONSIDERATIONS

Coffee break **16^{45}–17^{15}**

17^{15} *Yuldashev M.A., Salikhov T.V., Kamilov B.G., Karimov B.K.* RETROSPECTIVE ANALYSES OF INVASIVE FISH SPECIES INTRODUCTION IN THE ARAL SEA DRAINAGE BASIN ON EXAMPLE OF THE REPUBLIC OF UZBEKISTAN

17^{30} *Mishvelov E.G., Pushkin S.V.* ENDEMISM, RELICTS AND INVASION SPICES OF ANIMALS IN STRUCTURE OF THE BIODIVERSITY OF THE CENTRAL CISCAUCASIA

DAY 4: SEPTEMBER 25, 2013

Special Session

THE SMALL CONFERENCE HALL OF THE IBIW RAS

The role of global climatic and anthropogenic processes in biological invasions

Session Chair: Yu. V. Slynko

9^{15} *Melnikov I.A.* NEW SPECIES INVASION INTO THE ARCTIC OCEAN PELAGIC ECOSYSTEM IN FRAME OF RECENT CLIMATE CHANGE

9^{30} *Mel'nikov Yu.I.* CYCLIC INFESTATIONS OF ALIEN SPECIES IN EASTERN SIBERIA AS REFLECTANCE OF THE GENERAL PROCESSES OF THE CLIMATE DYNAMICS OF CENTURY LEVEL (ON THE EXAMPLE OF BIRDS)

9^{45} *Znamenskiyi S.R.* ALIEN PLANT SPECIES IN DRY MEADOW COMMUNITIES OF KARELIA, CENTURY DYNAMICS IN 1900TH

Information systems of monitoring of the invasive process. Mathematical modeling of the processes related to invasion of alien species.

Session Chair: V. G. Petrosyan

10^{00} *Olenin S., Narščius A.* AN INFORMATION SYSTEM ON AQUATIC NON INDIGENOUS SPECIES (AQUANIS)

10^{15} *Morozova O.V., Borisov M.M., Fleis M.E.* FREE GEOINFORMATION SYSTEM "ALIEN PLANT SPECIES OF EUROPEN RUSSIA"

10^{30} *Khlyap L.A., Bobrov V.V., Warshavsky A.A.* USING THE GIS TECHNOLOGY FOR STUDYING DIVERSITY OF ALIEN SPECIES IN RUSSIA (THE CASE OF MAMMALS)

10^{45} *Goryainova Z.I., Petrosyan V.G., Zavyalov N.A.* ASSESSMENT OF BEAVER'S (*CASTOR FIBER* L.) BUILDING ACTIVITY USING GIS AND REMOTE SENSING DATA

Coffee break **11^{00}–11^{30}**

Invasions in terrestrial ecosystems

Session Chair: R. I. Burda

11^{30} *Potapov M.B.[1], Russell D.[2], Greenslade P.* THE INTRODUCTION OF SOIL INVERTEBRATES IN AN EXTREME ECOSYSTEM: NON-NATIVE COLLEMBOLA IN ANTARCTIC

11^{45} *Tsvetkova Y.N., O.A. Kolobova, N.P. Kolomiytsev, N.Ya. Poddubnaya, D.A. Senina, M.O. Bistrovskaya.* THE INVASION OF THE AMERICAN MINK (NEOVISON VISON) – THE EXAMPLE OF OVERADAPTATIONS

12^{00} *Khoroon L.V.* THE ROLE OF THE MECHANISM OF FORMATION OF THE SECONDARY RANGE IN PROVIDING CONTACTS BETWEEN THE POPULATIONS OF ALIEN PLANT SPECIES

12^{15} *Kerchev I.A.* ECOLOGY OF *POLYGRAPHUS PROXIMUS* BLANDFORD (COLEOPTERA; CURCULIONIDAE, SCOLYTINAE) IN THE WESTERN SIBERIAN REGION OF INVASION

12^{30} *Kolodina M.A., Frolova S.V., Emelyanov A.V.* SPATIAL TEMPORAL DYNAMICS OF SOME ADVENTIVES TYPES ON TAMBOV REGION TERRITORY

12^{45} *Krivosheina M.G.* INTERACTIONS BETWEEN INVASIVE PLANT *HERACLEUM SOSNOWSKYI* AND NATIVE SPECIES OF INSECTS IN MOSCOW REGION

Lunch break **13^{00}–15^{00}**

Session Chair:* *Z. I. Goryainova

15^{00} *Leontiev D.F.* SPATIO TEMPORAL DYNAMICS DISTRIBUTION OF MUSKRAT (*Ondatra zibethicus*) AND MINK (*Neovison vison*) IN VERHOLENE AND R. LOWER TUNGUSKA

15^{15} *Listopadsky M.A.* ALIEN BIRDS' SPECIES IN THE BIOSPHERE RESERVE "ASKANIA NOVA": BIOCENOTIC ASPECTS OF INVASION

15^{30} *Chunxu Han* BCGC-promoting prevention and control of biodisaster

15^{45} *Nikolin E.G.* THE WEED AND ALIEN PLANTS OF YAKUTIA

16^{00} *Orlova-Bienkowskaja M.Ja.* ECOLOGICAL CATASTROPHE: THE EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) IS DESTROYING ASHES IN NINE OBLASTS OF EUROPEAN RUSSIA

16^{15} *Petelis K., Narauskaite G., Brazaitis G., Bartkevicius E.* ALIEN AND INVASIVE GAME ANIMAL SPECIES IN LITHUANIA

16^{30} *Rakhimova Y.V., Nam G.A.* FOR MYCOBIOTA OF SOME INVASIVE SPECIES OF VASCULAR PLANTS IN THE KAZAKHSTAN

Coffee break **16^{45}–17^{15}**

17^{15} *Rutkovska S., Pučka I.* ANALYSIS OF PLANT COMMUNITIES OF *ERIGERON CANADENSIS* L., *SOLIDAGO CANADENSIS* L. S.L. AND *HELIANTHUS TUBEROSUS* L. WITHIN THE TERRITORY OF DAUGAVPILS CITY (LATVIA)

17^{30} *Kadulin S.G.* "AMNIS" INTEGRATING FLOW CYTOMETRY AND MICROSCOPY TO NEW LEVEL OF CELL RESEARCH

17^{45} *Sheremetev I.S.* THE PALAEO-INVASIVE UNGULATES IN THE RUSSIAN FAR EAST AND THEIR INFLUENCE ON ENDEMIC SPECIES AND COMMUNITIES

18^{00} *Starodubtseva E.A., Grigorjevskaja A.Ja., Morozova O.V., Vladimirov D.R.* PROJECT OF THE VORONEZH REGION BLACK LIST

18^{15} *Burda R.I.* THE SPATIAL AND TEMPORAL DYNAMICS OF PLANT INVASIONS IN THE FLATLAND PART OF UKRAINE

18^{30} *Schanzer I.A., Kochieva E.Z., Kulakova Y.Y.* CENCHRUS LONGISPINUS INVASION IN S RUSSIA AND UKRAINE: A PRELIMINARY ANALYSES OF MOLECULAR DATA

18^{45} *Hongmao Zhang* INTERSPECIFIC FOOD PILFERAGE BETWEEN SYMPATRIC SMALL RODENTS AND ITS POTENTIAL EFFECTS ON RODENT- MEDIATED SEED DISPERSAL

DAY 5: SEPTEMBER 26, 2013

THE MAIN CONFERENCE HALL OF THE IBIW RAS

10.00–13.00 **Poster session**

Session Chairs:* *L. G. Korneva, R. I. Burda, D. F. Pavlov, R. Novitsky, V. P. Semenchenko, Yu. V. Slynko

Abramova L.M. ROLE OF MODERN CLIMATIC AND ANTHROPOGENIC CHANGES IN ACTIVIZATION OF INVASIONS OF ALIEN SPECIES OF PLANTS IN ECOSYSTEMS OF THE SOUTH URALS

Afanasev A.G. SEQUENOM "MassARRAY 4" – MASS SPECTROMETRY-BASED DETECTION SYSTEM FOR SENSITIVE, ACCURATE, AND RAPID GENE ANALYSIS

Aistova E.V., Rogatnykh D.Yu. CONSORTS OF SOME ADVENTIVE PLANT SPECIES IN THE AMUR REGION

Zybartaite L., Janulioniene R., Paulauskas A., Kupcinskiene E. MOLECULAR ANAYSIS OF LITHUANIAN *IMPATIENS PARVIFLORA* BASED ON SIMPLE SEQUENCE REPEAT MARKERS

Lunch break **13^{00}–15^{00}**

15:00 «The round table»:

1. Methods for the study of biological invasions.
2. Methods of control and eradication of invasive species.
3. Social and political aspects of biological invasions.
4. International and regional collaboration in alien species studies.

19:00 Farewell Party

DAY 6: SEPTEMBER 27, 2013

8:30 – 16:00 The excursions to the laboratories and museums of IBIW RAS. Excursion tour "Uglich and its museums". Perhaps voyage by ship.

THE MAIN CONFERENCE HALL OF THE IBIW RAS

17.00 General discussion and debate on the sums of the conference

Departure of participants

DAY 7: SEPTEMBER 28, 2013

10:00 Departure of participants by bus Borok-Moscow.

CONTENT

Abstracts of the IV International Symposium “Invasion of alien species in Holartic” are presented in author's edition.

TRANSFORMATION OF GENETIC STRUCTURE OF SILVER CRUCIAN CARP *CARASSIUS AURATUS GIBELIO* (BLOCH, 1782) POPULATIONS FROM THE BASIN OF AZOV SEA

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The silver crucian carp *Carassuis auratus gibelio* was the rare component of Azov Sea basin ichthyocenoses until the middle of XX century. Its population and genetic structure was characterized by absolute dominance of triploid (3n = 150) unisexual female gynogenetical form (Abramenko, 2001, 2011). The results of long term field studies revealed, that in last 25 years the diploid (2n = 100) bisexual genoform dominated in local freshwater and marine populations of crucian carp (Abramenko et al., 1997, 2004; Abramenko, 2003, 2012; Abramenko, Matishov, 2010). In general the subspecies consists of unisexual bisexual diploid triploid complex of different genoforms.

The trigger mechanism for population genetic structure transformation of *C. a. gibelio* was the anthropogenic changing in Azov Sea basin aquatic ecosystems functioning in the middle of XX century together with sharp decline of relative cyprinid species abundance. The latter were sperm donors for gynogenetical form breeding (Abramenko, 2009, 2011). The named processes forced the «shift» of ameiotic breeding type of unisexual female triploid form to meiotic type owing the synchronous ability for reproduction by both cytological mechanisms (Fan, Shen, 1990; Feng Zhang et al., 1992; Zhou et al., 2000). The triploid males of crucian carp with sexual XYY chromosomes (Abramenko et al., 1998, 2004; Abramenko, 2008) occurred in gynogenetic progenies of triploid females with XXY gonosomes (Zan, 1982) as a result of recombination of gonosomes in prophase I of meiosis.

Owing the mixoploid gametogenesis of triploid females and males (Abramenko et al., 2004, Abramenko, 2005) the presence of haploid (n = 50) male and female gametes determined the stable occurrence of diploid bisexual form because the meiotic combinative breeding is beneficial in sharp environmental change (Cuellar, 1977). The prevailing of diploid bisexual form with complex behavior in meiotic breeding (Ochinskaya, Astaurova, 1974) forced the distant migrations in Azov Sea basin freshwater and marine ecosystems for spawn and feeding, not registered earlier. This, in turn, helped creating the new local populations, including pond fishing farms and reservoirs (Abramenko, 2003, 2011).

The relationship, which regulated the breeding of early dominated triploid ginogenetic form by direct link to abundance and spawn time of related species males, disappeared with the appearance of significant amount of conspecies males in *C. a. gibelio* populations. The reproductive behavioral and environmental factors are interrelated processes in diploid bisexual form dominance, their cyclic repetition determines the priority of different genoforms spawning and the genetic population structure in Azov Sea diploid triploid complex of crucian carp. The transformation of sexual and genetic structure of Azov Sea crucian carp general population with the sharp growth of abundance and area of subspecies distribution was the result of environment and cytogenetic change (Abramenko, 2003, 2009, 2011, 2012).

The dynamic regimes, in which the population of *C. a. gibelio* consists of triploid females only, with the small number of triploid males (condition A); diploid males and females (condition B) or have the metastable intermediate distribution of different genetic forms of subspecies (condition C), could be seen in numerical simulation. At present the genetic structure of general population of Azov Sea basin crucian carp is in condition C. The important notice is that the shift to condition B in terms of the numerical simulation is reversible (Abramenko et al., 2004).

ROLE OF MODERN CLIMATIC AND ANTHROPOGENIC CHANGES IN ACTIVIZATION OF INVASIONS OF ALIEN SPECIES OF PLANTS IN ECOSYSTEMS OF THE SOUTH URALS

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In the last decades in the South Urals activization of invasions of aggressive neophytes is observed. Since 1995 we conduct researches of processes of introduction of alien species: search and monitoring of the centers of an invasion, studying of their biology and ecology in new conditions of habitation, the description of communities with their participation, elaboration of control methods of number. By us it is revealed 30 neophyte invasive species constituting danger to ecosystems of the region and widely settled or tending to active moving: *Acer negundo, Amaranthus albus, A. blitoides, Ambrosia artemisiifolia, A. trifida, A. psylostachya, Artemisia sieversiana, Bidens frondosa, Bryonia alba, Cardaria draba, Collomia linearis, Conyza canadensis, Cyclachaena xanthiifolia, Echinocystis lobata, Elsholtzia ciliata, Elodea canadensis, Fraxinus pennsylvanica, Galinsoga ciliata, G. parviflora, Helianthus tuberosus, H. lenticularis, Heracleum sosnowskyi, Hordeum jubatum, Impatiens parviflora, I. glandulifera, Oenothera biennis, Portulaca oleracea, Solidago canadensis, Urtica cannabina, Xanthium albinum.*

From invasive neophytes for ecosystems of the South Urals first of all pose threat of *Ambrosia trifida, A. psylostachya, Cyclachaena xanthiifolia, and also Hordeum jubatum, Oenothera biennis, Acer negundo, Bidens frondosa, Echinocystis lobata* and some other species which not only are actively settled in anthropogenic ecosystems, but also are naturalized in natural ecotops, most often in flood plains of the rivers of the region.

The main reasons for activization of expansions of invasive species in region of the South Urals in the last decades – anthropogenic. They are connected with changes in maintaining agricultural production – formation of big areas of the thrown and raw lands open for invasions, and also fast development of economic relations between regions, as within the country, and with foreign countries, and transport ways on which the mass of freights to which there is a drift of alien species of plants is delivered. Activization of invasions is promoted by modern warming of the climate, allowing to be naturalized and give viable posterity to more thermophilic alien species, such as species of genus *Ambrosia*, absence of the natural enemies phytophages constraining their distribution on the historical homeland, and an uncontrollable introduction of new species, forms and sorts of plants which run wild and are naturalized.

Work is performed with financial support of the Presidium Program of the Russian Academy of Sciences "Wildlife: modern state and development problems" and Russian Fund of Fundamental Investigations. Project No. 12 04 00336a.

CONSORTS OF SOME ADVENTIVE PLANT SPECIES IN THE AMUR REGION

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Over the past 100–150 years, a number of adventives species not only have successfully adapted to grow on the waysides, railroad embankments, landfills, and in disturbed habitats but have also become a component of agrocenotic flora in the Amur Region. One of the major problems associated with controlling and studying the adventive plant species is that is no data about the native insect species belonging to the genus phyllophaga at the introduction sites are available. In 2010–2012, studies aimed at identifying the possible consorts of adventives plants belonging to the families Malvaceae Juss. (*Abutilon theophrasti* Medik., *Hibiscus trionum* L.) and Asteraceae Dum. (*Xanthium albinum* (Widd.) H. Scholz., *X. strumarium* L.) were carried out. It is no coincidence that these species have been selected. *Hibiscus trionum* appeared in the Amur region in the early XX century, while the rest of the species appeared in the late XX century.

Our survey has demonstrated that insects trophically related to the aforementioned adventive species are their major consorts; most of these insects belong to the genus Phyllophaga. The following types of leaf damage by insects were detected: chewing off the lateral part of the leaves and making individual holes in the leaf blade.

First order consorts include the genus phyllophaga and are trophically related to plants. A total of seven species have been detected; among them, *Monolepta quadriguttata* (Motschulsky, 1860) and the members of superfamilies Aphidoidea and Coccoidea damaged leaves and stems of *Hibiscus trionum*. Caterpillars of *Helicoverpa armigera* (Hubner, [1808]) and *Vanessa cardui* (Linnaeus, 1758), imago of *Monolepta quadriguttata,* and members of superfamily Aphidoidea were found on leaves and seeds of *Abutilon theophrasti*. Leaves and stems of *Xanthium albinum* and *X. strumarium* were damaged by *Helicoverpa armigera*, *Ostrinia furnacalis* (Guenee, 1854), *Epicauta megalocephala* (Gebler, 1817), and *E. sibirica dubia* (Fabricius, 1781).

Second order consorts include predatory and parasitic invertebrates that feed on first order consorts: *Macrocentrus cingulum* Brischke, 1882, *Sinophorum* sp.; *Adonia variegata* (Goeze, 1777); *Propylea quatuordecimpunctata* (Linnaeus, 1758); *Anatis ocellata* (Linnaeus, 1758).

Thus, the replenishment of native flora with new species results in changes in the corsortium complex, i.e., phytophagous insects get new plants to feed on, which broadens their relationship, on one hand. On the other hand, it is necessary to study the consortium relationships to understand the trophic interactions in the system adventive plant – parasitic insect – predatory insect, which is of great importance for designing the methods for land treatment and alternative approaches to protect cultivated plants, as well as for monitoring the dissemination of adventive plants.

NEW APPROACH TO SOLVE THE PROBLEM OF BIOLOGICAL INVASIONS

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Problem related to invasive species interpreted, as a rule, in a negative aspect. Not by chance her synonym is «biological contamination». Penetration of any new species is already badly on determination. It is accepted, that invasive species present a threat to the aborigine species, with that enter into hard competition relations within the limits of similar ecological niches. That kind of interrelation is often examined as a threat to the biological diversity of ecosystems in that they get.

If on artificial migration of organisms to look in a different way, it is possible to ground diametrically opposite opinion. Introduction of invasive species is extraordinarily useful; if an ecosystem is disturbed by anthropogenic influence, i.e. take out of natural equilibrium. In such conditions aborigine species do not cope with flow of substance and energy. Invasion species, if their specific production appears higher than mass aborigines, can replace last and more effectively to use surplus of accessible substance and energy. New biological invasions intensify the process of microevolution and maximally effectively involve new species into environmental conditions changed by a man. Not occasionally according the decision of European Commission (2010) non indigenous species have been included to descriptors of «good environment status – GES» of aquatic ecosystems. High number of invasion species is an indicator of ecosystem trouble. Although that point of view have been substantiating, invasions can possible to have some hazard effects that must be foreseen. In the process of technologies development of productive activity of man there is a concentration of the energy used by him. From one side it assists the increase of efficiency of production, from other strengthens anthropogenic impact, including due to the increase of their energy intensity. Such regularity will result in the increase of heterogeneity of spatial distribution of contamination, for example, for aquatic ecosystems as a result of strengthening of his receipt from land based sources. Contamination is the source of mutagenic activity of organisms of different taxonomic groups and will strengthen this effect as far as growth. As a rule, invasive species naturalized in an ecosystem recipient appear most adjusted to the terms that showed her out of the equilibrium state. Just they first of all will be the objects to mutagenic influence and first it will be take root in new conditions. The modified genes have a pleiotropic effect in the different conditions of environment. As possible effect can appear the reduction of biological diversity on the whole, worsening of water quality, decline of the productivity, or complete disappearance of valuable commercial species. Many invasive species in new conditions as compared to their origin area can substantially differ on their morphological and physiological characteristics. Investigations in area of biological invasions in a greater measure must be oriented not to determination their species composition, quantitative development and dynamics of their expansion in research area, but to the estimation of genotypic variability of non indigenous species, to study of their population characteristics, sensitiveness to the priority types of influence factors of natural or anthropogenic origin, and also mutual relations with dominant native species.

FRESHWATER FISH FAUNA OF SOLOVETSKY ISLANDS (WHITE SEA): NATURAL COLONIZATION AND RECENT INTRODUCTIONS

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Solovetsky islands are located in central part of the White Sea (Arctic Ocean). Several centuries of freshwater lakes and small brooks exist there. The human impacts on the ecosystem vary in time for different lakes. The modern status of freshwater fish fauna (species composition and distribution) in various watersheds of the biggest island of the Solovetsky Archipelago – Bolshoy Solovetsky and Anzer islands was studied. The research was conducted in the period from 1989 to 2012, altogether 40 lakes were studied. On the basis of data analysis, including historic sources, two main groups of species were defined: 1) aborigine and 2) introduced. Whitefish (*Coregonus lavaretus*), rainbow smelt (*Osmerus mordax*), yellow perch (*Perca fluviatilis*), pike (*Esox lucius*), roach (*Rutilus rutilus*), burbot (*Lota lota*), ide (*Leuciscus idus*), crucian carp (*Carassius carassius*), sticklebacks (*Gasterosteus aculeatus, Pungitius pungitius*), ruff (*Gymnocephalus cernuus*) are aborigine while starlet (*Acipenser ruthenus*), brown trout (*Salmo trutta*), European cisco (*Coregonus albula*), peled (*Coregonus peled*), tench (*Tinca tinca*), Prussian silver carp (*Carassius auratus*) are introduced. The present day distribution of all species is mosaic and vary dramatically between lakes, the origin of particular species should be found out individually for each lake.

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THE SETTLEMENT HISTORY OF SEWER RAT IN BISHKEK AND THE CHUI REGION OF KYRGYZSTAN

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Sewer rat is one of the most widespread mammals in the world. Over the past 30 years there has been a significant expansion of the area of sewer rat, particularly, in Kazakhstan and Central Asia, it has begun to settle even atypical habitat.

The first signals from the population of Frunze (now Bishkek) concerning the appearance of sewer rats arrived in the mid eighties of the past century, but only in 1993 the dwelling of the rodent in the city was well established. The first animals that were captured varied in coat color: they were black and white, white, and gray. This color meant that the rats were the descendants of white laboratory rats in a variety bred for laboratory use. Breeding of rats and their escapes were constant, but the mass resettlement of animals was not detected.

The (wild) sewer rat was brought to Bishkek in bulk cargo supply at the same time. By that time, a population of free living laboratory (white) rats had already existed in the city. This naturally led to perpetuation of sewer rat by hybridization of imported sewer rats with white rats.

In support of this statement the newly formed population of sewer rat in the Chu Valley has been analyzed at the genetic level; the analysis confirmed the hybrid nature formed by at least a few of introduced laboratory lines (including the "August Hood", "Wistar") of synanthropic migrants from vivariums of the Research Institute and natural populations of wild phenotype of the Rattusnorvegicus type.

The viability of mixed population of sewer rat increased dramatically; the rat began to actively explore the city and settle in the Chui region. Now sewer rat inhabit the whole territory of Bishkek; sewer rat inhabit virtually all types of buildings; the rodent evict to open stations during the warmer months.

The comparison of the density of population of sewer rat in the Chui region in the period of 2005–2010 indicate that the density increases each year. Sewer rat has increased its area by 17%; stable habitat has been marked by 31% of respondents.

Sewer rat has advanced 212 km from west to east of the region (the Chaldovar village – the Tegirmenchi village) and 57.5 km from north to south (the Kamyshanovka village – the Ak Bashak village).

There is some dependence on the sewer rat resettlement of the people’s population. High population density leads to an increase in household and food waste, just as cattle and pets in the countryside; the increasing of the number of service sectors for the population (cafes, mini markets, various trade stalls) is likely to contribute to the consolidation and further spread of rats.

OUTLINING SOME OF ZOONOTIC INFECTIONS IN RODENTS IN KYRGYZSTAN

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Studies of presence of zoonotic infections in rodents in Kyrgyzstan started in 1939 and identified the natural focal diseases: plague, necrobacillosis, leptospirosis, Q fever, tick borne spirochetosis, Asian tick typhus, leishmaniasis, tick borne encephalitis, listeriosis, erysipeloid, rabies, toxoplasmosis, anaplasmosis.

Since 1994 and up to date, the joint efforts of Kyrgyz and Kazakh scientists have provided the conducting of research of the presence of zoonotic infections in sewer rats, and since 2010 in other species of rodents. The diseases of rodents that had been previously identified have not been diagnosed; therefore, we do not exclude their existence in the present.

The comparative analysis of infection in rodents in previous studies and now have found most of various zoonotic infections in wild mouse – 12.3%, the house mouse – 11.4%, and the sewer rat and Kyrgyz voles – 8.6% each.

Earlier data have given the leading position to such infections as leptospirosis – 18.0%, necrobacteriosis – 12.4% and Q fever – 10.4%. In recent years, the following infections have been widespread: pseudotuberculosis – 8.6%, intestinal yersiniosis – 7.6%. Over the study period, leptospirosis and listeriosis have been frequently identified.

The presence of Tyulek fever, Japanese encephalitis (1994–1996) and rabies (2000) has been identified in the bodies of sewer rats in Bishkek. The plague, tularemia and brucellosis microbes antibodies have not been identified.

In the Issyk Kul region in 2010, antibodies to the agents of some infections were detected in 139 (12.2%) of rodents. Of these, 8 animals had mixed infections: tamarisk gerbil – pseudotuberculosis and leptospirosis, listeriosis, and leptospirosis, brucellosis and intestinal yersiniosis, wild mouse brucellosis and intestinal yersiniosis, pseudotuberculosis and leptospirosis, house mouse listeriosis and leptospirosis; pseudotuberculosis and leptospirosis, Kyrgyz vole – brucellosis and pseudotuberculosis.

In the Osh, Jalal Abad, Talas and Issyk Kul regions in 2011, 11 rodents (17.5%) of 63 caught rodents had antibodies to the agents of zoonotic infections, including the 3 rodents that had mixed infections: Kyrgyz vole pseudotuberculosis and leptospirosis, sewer rat – intestinal yersiniosis and listeriosis, intestinal yersiniosis and listeriosis.

It should be noted that southern Kyrgyzstan is one of the densely populated regions of Central Asia, and the zoonotic infections in rodents, migrating for the winter in the village, can infect people.

No less dangerous are the numerous infections found in rodents in the Issyk Kul region, which may lead to a deterioration of the epidemiological situation here in the tourist season. In the Chui region and in Bishkek, in particular, the concentration of people is the highest, so it is necessary to continuously monitor rodent infestation, especially the synanthropic ones.

DIGESTIVE GLYCOSIDASE OF AMUR SLEEPER UNDER THE EFFECT OF ROUNDUP HERBICIDE

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A highly technological systemic herbicide with a wide spectrum of effects – glyphosate [N (phosphonomethyl) glycine] – has been used since the mid 1970s. Many herbicides were formulated on the basis of its active compound – isopropyl amine salt of glyphosate. Roundup is the world's most widely used herbecide. The wide use of glyphosate containing herbicides to kill weeds in the fields, collector and drainage canals, irrigation systems and ponds, and the possibility of their entering waterbodies necessitate studies on their toxic effect upon aquatic organisms. The published data on the glyphosate toxicity predominantly concern acute toxicity and the chronic influence of low sublethal concentrations of the herbicide on bacteria, microalgae, protozoa, crustacean zooplankton and fish. But its effect on the hydrolysis of carbohydrates which plays an important role in energy metabolism of the fish has not been studied yet.

The aim of this work is to study the effect of the Roundup on the activities of glycosidase, hydrolysing carbohydrates in the intestine and the whole body of juveniles Amur sleeper ***Perccottus glenii*** Dyb. in vitro and in vivo experiments.

The amylolytic activity, reflecting the total activity of enzymes hydrolyzing starch (α amylase, glucoamylase, and maltase) and the activity of sucrase and maltase, hydrolyzing disaccharides sucrose and maltose, under Roundup in the concentration of 0.1–50 µg/L (20ºC, pH 7.4) in the whole body homogenates were studied in vitro. The herbicide reduces amylolytic activity by 11% only under a very low concentration (0.1µg/L). The sucrase activity does not change but the maltase activity decreases by 6–16% under Roundup in the concentration of 1–25 µg/L. These results indicate the greater stability of glycosidase, hydrolysis of starch, in the whole body of Amur sleeper to the Roundup herbicide, compared with the enzymes of the juvenile roach, perch and pike (Golovanova et al., 2011). In Amur sleeper which has been affected by saprolegnioses, the amylolytic and sucrase activity in the presence of Roundup do not change, the maltase activity reduced by 24% only at the lowest concentration of the herbicide, and significantly increased by 45–83% of control in the concentrations of 10–50 µg/L.

The chronic action of Roundup at the concentration of 2 µg/L for 30 days reduces the amylolytic activity in the intestine of Amur sleeper by 40% compared with control (concentration of the Roundup 0 µg/L). At the same time the sensitivity of glycosidase to Roundup in vitro decreased. Thus, the inhibition of the amylolytic activity of the intestinal mucosa in fish from control group under Roundup at the concentration of 0.1–50 µg/L was 47–64%, and in fish of the experimental group it was only 13–21%. The dependence of the effect on herbicide concentrations was not found. The maltase activity in the intestine of Amur sleeper of control and experimental groups is almost similar, but larger values of the Michaelis constant of maltose hydrolysis in fish of the experimental group testify to the reduction of the enzyme substrate affinity, indicating a decrease in the efficiency of the initial stages of hydrolysis of carbohydrates under chronic effect of low Roundup concentrations.

Thus, the Roundup herbicide in a wide range of sublethal concentrations of 0.1–50 µg/L can affect the activity of glycosidase in the intestine and in the whole body of Amur sleeper. The value and direction of the effect depends on the physiological state of the fish, herbicide concentration and exposure conditions. Since the enzymes of preys can participate in autolysis, modifying effects of Roundup, probably change not only the activity of enzymes in the tissues of the prey, but also the contribution of the exoenzymes to the processes of digestion of consumers.

GENETIC METHODS FOR THE CONTROL OF ALIEN SPECIES

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The control of alien species populations is a complex but important task in the strategy for the conservation of biodiversity in natural ecosystems, because invaders may cause considerable economic and ecological damage. This study deals with the methods for preventing the formation of alien species populations in nature (sterilization and the induction of the development of unisexual groups and conditionally sterile mutants), as well as control of the existing populations of these species (Trojan genes, hybridization with genetically different forms, and changes in the host gene pool for controlling pathogens). It is concluded that, although genetic methods of the control of alien species are promising, their development is hampered by insufficient attention of the scientific community, economic organizations, and governmental agencies.

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ABOUT BLOOMING OF THE *CYLINDROSPERMOPSIS RACIBORSKII* AND APPEARANCE OF OTHER INVASIVE SPECIES (CYANOBACTERIA) IN PHYTOPLANKTON OF HIGHLY EUTROPHIC LAKE NERO (RUSSIA)

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Range expansion of the planktonic pantropical cyanobacteria *Cylindrospermopsis raciborskii* (Woloszynska) of Seenayya et Subba Raju to the water bodies of the temperate regions is widely discussed and goes on in Europe, America, Asia and Australia. This organism is capable of producing cyanotoxins: cylindrospermopsin, anatoxin a and saxitoxin. Firstly we recorded mass proliferation at the highest latitudes of its occurrence (57ºN) at Lake Nero of the Yaroslavl Region. In 2008–10 hepatotoxin microcystin were found for the first time, and in August 2010 trace quantities of dissolved cylindrospermopsin were detected using liquid chromatography / tandem mass spectrometry. Judit Padishah (1997) in the brilliant review noted high ability of *C. raciborskii* to expand it’s range due to its ecological competitive advantages: mobility, resistance to low and high illumination, to water mixing, resistance to grazing, capability to fix nitrogen from water. *C. raciborskii* has relatively high affinity and ability to reserve phosphorus if compared to the other cyanobacteria. Mass proliferation of *Cylindrospermopsis raciborskii* in Lake Nero occurred during a blocking anti cyclone in the summer of 2010. The water temperature (June August) was within the range 26.6 to 29ºC and water transparency decreased to 0.2 m. Small amounts of trixomes were detected in July. The peak of abundance – 253 million cells /L, 11.2 million trixoms/L and 5.2 mg/L that made 30.5% and 23.3% of the total number and biomass respectively was observed in August. In September the quantity of the species decreased sharply down to the trace quantities. In 2011 we also found the single threads in July September, and in 2012 it was absent. *C. raciborskii* species did not appear at the beginning of the stabile heat, but at least a month later, the peak of their abundance was short. The community structure at the level of large taxonomical groups from June to September changed slightly. *Cylindrospermopsis raciborskii* was literally built in phytoplankton on a short period, despite a high biomass of a dominating complex (*Pseudanabaena limnetica, Limnothrix redekei, Planktothrix agardhii)* and low transparency of water pointing at its high shade tolerance, plasticity and functional activity. *Cylindrospermopsis raciborskii* is close by it’s eco physiological properties to the group of the dominants, except for the smaller sensitivity to the concentrations of biogenic elements and higher temperature optimum. The prolonged high temperature served as the trigger of its mass development and confirmed the expected scenario of its expansion by climate warming. Other thermophilic, invasion brackish water algae *Aphanizomenon issatschenkoj* (Issatch.) Pr. – Lavr., *Aph. Elenkinii* Kissel. met in a reservoir in a small amount since the end 80–90 kh years of last century, in the last three years their occurrence increased. *Anabaena bergii* f. *minor (*Kissel.) Kossinsk. appeared in summer of 2010–12 years. This invasion expectably appears in a phytoplankton of Lake of Nero. Low transparency, water level, high biogenic load, mineralization, resistant time of the water and throphic conditions are demanded by invasion species. The high summer temperatures are favorable that expands a distribution area, creates conditions for acclimatization and adaptation to more severe climate and possibility of further expansion, as a rule, dangerous potentially toxic types.

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ALIEN SPECIES OF FISH IN THE RESERVED LAKE MARKAKOL (EAST KAZAKHSTAN REGION)

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The lake Markakol is located in the East Kazakhstan region, in the mountains of Southern Altai, at the height of 1449.3 m above sea level. The lake is characterized by ultra fresh water, about 50 inflows into the lake, and one outflow – the river Kaldzhir which flows into the Black Irtysh river. The lake was formed during one of glacial eras of the quaternary period as a result of tectonic processes. The age of the lake determined by accumulation of sea floor sediments makes about ten thousand years (Sergiyko et al., 1993).

Falls in the middle current of the river Kaldzhir served as a natural barrier to penetration of fish of the Irtysh River to the lake Markakol. The lake's fish fauna by results of researches of the 30–50th years of the last century (Menshikov, 1938; Mitrofanov, 1961) consisted of four species of fish – Lenoks of *Brachymystax lenok* (Pallas, 1776), Siberian grayling *Thymallus arcticus* (Pallas, 1776), Gudgeon *Gobio gobio* (Linnaeus, 1758) and Siberian Stone Loach *Barbatula toni* (Dybowski, 1869). In 1972 the lake Markakol was inhabited Rainbow trout *Parasalmo mykiss* (Walbaum, 1792) with the purpose of acclimatization. Ten thousand of yearling fish served as planting stock. The grown up adult individuals in the lake reached the weight of 3–4 kg. Since the end of the 70th years rainbow trout has not been noticed in the lake anymore. There are many reasons of unsuccessful acclimatization, among which a single introduction of young fish and outflows of generators from the lake to the river Kaldzhir.

Common minnow *Phoxinus phoxinus* (Linnaeus, 1758) was found in the lake Markakol in 1987. It is an unauthorized occupant from the river Belyozek. The source of this river flowing into the Black Irtysh and the source of the river Urunkhayka flowing into the lake Markakol are divided by a small watershed. By some eyewitnesses' evidence, some inhabitants of the nearby village of Urunkhayk in the early 80 s made a catch of minnow from the source of river Belyozek and inhabited them to the source of the river Urunkhayk. Now this kind is widespread in all water area of the lake, in the bottom sites of the rivers of all its inflows and in the source of the river Kaldzhir. It is numerous. There is a congestion of minnow on lenok's spawning hillocks, presumably with the purpose of excavation of lenok's and eating of the laid caviar. Local people use minnow as food for pets.

Till the 90 th years of the last century the native fish fauna of the lake Markakol was protected by its reserved status and by entrance restriction in connection with a frontier regime. After weakening of the regime amateur fishery has been developed. One of the negative after effect was the emergence in the lake of two species of fish – Stone moroko *Pseudorasbora parva* (Temmink, Schlegel, 1846) (Kulikov et al., 1999) and a kind of fish which systematic status isn't defined yet, but, according to G.M. Dukravts it belongs to the type *Alburnus or Alburnoides*. Fish of both types were brought by visiting fishermen as baits on their hooks during winter ice fishing. Most likely, plenty of brought alive fish were let out to the lake where they have got acclimatized.

The biology of alien species of fish in the conditions of the lake Markakol isn't studied.

UNITED THEY STAND: INVASIVE BARK BEETLE–OPHIOSTOMAL FUNGUS ASSOCIATION DESTROY FIR TAIGA FOREST IN SIBERIA

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Four-eyed fir bark beetle ***Polygraphus proximus*** Brandford (Coleoptera: Curculionidae, Scolytinae) and its associate, blue-stained fungus ***Grosmannia aoshimae*** Masuya et Yamaoka are responsible for diffusively widespread outbreak in fir taiga forests of Southern Siberia. The association was moved here from the Russian Far East presumably 15-20 years ago with the row logs transported by trains from the Russian Far East and settled local populations expanded to the South and North from the Trans-Siberian railroad.

For a moment recent and former outbreaks officially cover few hundreds thousand hectares in Tomsk, Kemerovo and Novosibirsk Oblasts, Krasnoyarsk and Altay Krays and Republics of Altay and Khakasiya i.e. on the territory compared with France, and ***P.proximus*** is considered to be the most aggressive bark beetle ever found on firs in Siberia.

Previously, only ***Monochamus urussovi*** Fish., a cerambicide species, was known to be able to attack and kill healthy firs. Both beetle and fungus were never recorded in Siberia before and appear to be extremely aggressive for the local fir ***Abies sibirica*** Ledeb. More intriguingly, ***P. proximus*** introduced into new environment, is acquiring fungi with which it was not associated in the Far East. A local fungus ***Leptographium sibirica*** Jacobs et Wingfield is also transported by the beetle from tree to tree. Previously ***L. sibirica*** was associated exclusively with the aggressive pest of firs in Siberia – sawyer beetle ***M. urussovi*** where it was believed to be a main tool of firs weakening.

The introduced insect has thus received a novel suite of fungal associates and this might explain why a relatively non-aggressive insect pest in the Far East has become a serious and damaging pest in Siberia.

MICRUROPUS POSSOLSKII SOWINSKY, 1915, A NEW CRUSTACEAN INVADER IN LAKE LADOGA

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During the 1960s and 1970s *Micruropus possolskii* together with *Gmelinoides fasciatus* (Stebbing, 1899) was introduced into reservoirs of Russia, Kazakhstan and Central Asia (Zadoenko, 1995) with the aim of enhancing food base for fish. Now *G. fasciatus* is widespread in different waterbodies of the European part of Russia. In Lake Ladoga it was found in 1988, and in the Shchuchiy Bay – in 1989 (Panov, 1994). After penetrating the lake *G. fasciatus* occupied all the littoral biotopes and finally became the dominant component of the benthos (Littoral zone ..., 2011). *Micruropus* has naturalized only in the Upper Ob basin (Wieser, 2010) and Iriklinskoye Reservoir (Filinova, 2012) by the early 2000s.

The Baikalian amphipod *M. possolskii* was first recorded on August 6, 2012 at two sites in the Shchuchiy Bay (61º05' N, 30º05' E), which is located in the north western part of the Lake Ladoga. The bay area is 0.4 km^2, average depth – 2.0 m, maximum – 3.6 m. This bay was influenced by wastewaters of the Priozersk pulp and paper mill (PPM) for more than two decades. Its ecosystem was completely destroyed and characterized as a "dead zone". Restoration of macrobenthos communities began in 1987 after PPM closing in 1986. Since then, the species diversity and density of invertebrates have increased from year to year. By the late 1990s a new ecosystem formed in the bay (Raspopov et al., 2003).

In August 2012, the density of benthic animals near the dam and in the center of the bay equaled 5640 ind./m^2 on both sites. The biomass was 13.1 and 6.9 g/m^2, respectively. On the site near the dam the basis of the total biomass was formed by molluscs (42.9%), chironomids (26.6%), oligochaetes (18.3%) and amphipods (10.7%). Amphipods were represented by two species: *G. fasciatus* (400 ind./m^2, 0.7 g/m^2) and new invader *M. possolskii* (1040 ind./m^2, 0.7 g/m^2). The share of *Micruropus* constituted 72% of density and 50% of biomass of crustaceans. On the site in the center of the bay chironomids dominated (78% of density and 58.6% of biomass). Only invasive amphipod *M. possilskii* (520 ind./m^2, 0.96 g/m^2) was found on this site.

Time of *M. possolskii* penetration of Lake Ladoga is not clear. Probably, it appeared in the lake together with *G. fasciatus* in the late 1980s, but it had not been registered in our samples because its distribution area and quantitative development were very low. It can be suggested that *M. possolskii* have invaded the Shchuchiy bay only after the improvement of the ecological state in late 1990 or early 2000s. The presence of this species in the other habitats of the littoral zone of the lake is possible, but there is no evidence of it now.

M. possolskii refers to burrow forms, prefers well heated biotopes and silted sand. Distribution of this crustacean is limited with shallow coastal waters, protected from the effects of the cold deep waters. It is reasonable to expect that *M. possolskii* will be capable to spread in the littoral zone of the lake. However, the probability of reaching mass development by this species is low.

IMPACT ASSESSMENT OF BEAVER REINTRODUCTION ON AMPHIBIANS OF SMALL RIVERS

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Due to large scale reintroduction of beavers (*Castor fiber* Linnaeus, 1758) in mid century, nowadays this species is widespread and inhabits a vast territory from taiga to steppe. Because of long absence of beavers in natural habitats, the restoration of beavers within the native area becomes actually a new invasion (Dgebuadze, 2000). Amphibians as semi aquatic species are very sensitive to changes in water bodies. So they are among the first who experience the results of beavers' impact on ecosystems.

Our studies began in Rdeysky nature reserve in valleys of the small rivers Kopeynitsa and Gorelka in 2006, and continued in Prioksko Terrasny nature reserve (river Tadenka) in 2009. These small rivers have been inhabited by beavers at different years, so conditions in the rivers are different. In the valley of Tadenka (reintroduction of beavers in 1948) beavers population has reached total saturation of the environment ("climax" stage), so number of beavers settlements became stabilized (Zavyalov et al., 2010). Ecosystems of the small rivers nearby Rdeysky reserve (reintroduction in 1969–1979) are less stable – beavers are migrating regularly to look for better conditions in the valleys, and ponds exist during a short time (2–3 years).

Stable beaver populations are very important for amphibians. The main factor of beavers' impact on amphibians is water regime. Creating new water bodies and increasing diversity of habitats are beneficial to amphibians' spawning and metamorphosis. That leads to higher species diversity and biomass of amphibians. After long term influence of beavers' activities in river valleys, the vast majority of suitable habitats for amphibians become associated with beavers. Large ponds with shallows and cascades of small ponds are the most attractive habitats for amphibian spawning and metamorphosis, because they are well protected from spring floods.

In case when beavers populations are unstable, situation for amphibians isn't so obvious. Factor of water regime plays a positive role mainly in large ponds, where water level has maintained by beavers. When beavers leave ponds, especially in spring time, ponds become places of mass death of eggs or larvae. This happens because the fact that due to removal of trees by beavers, water bodies become more lighted and heat faster in spring, so their attractiveness for amphibian's spawning increases. However, if beavers don't maintain water level, good lighting leads to more intense drying of water bodies, so larvae of amphibians don't have time to reach metamorphosis.

Thus, we can say that the reintroduction of beavers has positive effect on the species diversity and abundance of amphibians. The more beavers populations are long term and stable, the greater amphibians depend on beavers habitats. However, in some cases (unstable populations, early stages of settlements, reducing or eradication of beavers populations, destroying of dams) impact of beavers on amphibians may be negative.

OCCURRENCE AND ABUNDANCE LEVEL OF *KELLICOTTIA BOSTONIENSIS* (ROUSSELET, 1908) IN LAKES OF THE NIZHNIY NOVGOROD REGION

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The North American rotifer *Kellicottia bostoniensis* (Rousselet, 1908) is found in the west and the southwest of the Nizhniy Novgorod region in lakes: Elovoe Volodarsky's, Svyatoe Dedovskoe Navashinsky, Bolshoe (Pustynnoe), Komsomolskoe (Pionerskoe) Ardatovsky, Rodionovo and the Roy Sosnovsky, and also in the lake Svyato Arzamas areas. Everywhere rotifer is observed along with the native representative of this genus – *Kellicottia longispina* (Kellicott, 1879). However, the share of invader varies between lakes that can testify to prescription of introduction. Apparently the greatest shares of invader are more evident for Elovoe lake. It is near the border with Vladimir region and from Kshchara lake, where *K. bostoniensis* has been found in mass quantity all through the water column (Zhdanova, Dobrynin, 2008). In the Elovoe lake this species also occupies all water column. Number *K. bostoniensis* exceed that *K. longispina* almost in 50 times. Invader essentially prevails over a native species and in the lake Komsomolskoe (in 90 times). In lakes Svyato and a parity Roy between *K. bostoniensis* and *K. longispina* are close: invader slightly prevails in the first, in the second – a native species. In lakes Svyatoe Dedovskoe, Bolshoe, Rodionovo and the Roy for studying overwhelming advantage remained for *K. longispina*: its number on two order exceeded that invader. It can testify about relative not for a long time of *K. bostoniensis* invasion in these lakes.

Distribution of *Kellicottia* and parity between rotifers on water horizons in lake Elovoe is shown in. In the beginning of July of no strict appropriateness in distribution of each of species was observed, the increase in a share of these rotifers among zooplankton with depth however is traced. It is visible that the greatest density *K. bostoniensis* and *K. longispina* are common for the lower horizons, with temperatures 5–7ºC. Both species avoid heated up surface water. Parity changes between two species are caused rather by *K. longispina* themselves, than by changes in number of *K. bostoniensis,*

In the beginning of August essential increase in the number of the invader from the top horizons to lower is traced accurately enough. A native species to this date is already generally «gives up» to the invader, completely disappearing on some horizons, and even on lower ones that are most suitable for *K. longispina* by temperatures. It is possible to make the assumption that the native species of genus *Kellicottia* – *K. longispina*, it is still recorded in a significant amount in first half of summer, completely disappears from a zooplankton in the late summer and it is replaced by *K. bostoniensis.*

Thus, invasion of *K. bostoniensis* to the Nizhniy Novgorod region occurs from the western direction, from outside Vladimir region where these species, possibly, has appeared a bit earlier. Among the Nizhniy Novgorod lakes American rotifer has appeared first of all in lakes of Volodarsky area adjoining to Vladimir region, in particular, in Elovoe lake. The further distribution of a species on the east and the southeast has included lakes of Navashinsky, Sosnovsky and Ardatovsky, in last turn Arzamas areas.

Rotifers of this genus successfully develop mainly in deep oligotrophic reservoirs with waters of a small mineralization. The native inhabitant of Nizhniy Novgorod lakes – *K. longispina* does not sustain a competition to the invader. The situation is aggravated with affinity of requirements to environmental conditions of these species. Thus, it is possible to make the assumption that the native species the next years or decades completely will disappear from the Nizhniy Novgorod reservoirs and its niche will be occupied with the American invader – *K. bostoniensis.*

ELODEA CANADENSIS MICHX. AND ASSOCIATED COMMUNITIES IN KENON LAKE (ZABAIKALSKY KRAI)

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For the first time *Elodea canadensis* Michx. has been registered in Kenon Lake in 2009 [Bazarova et al., 2010]. The results of three years observations of the communities' condition shows the reduction of the acclimated territories' square and the phytomass. In 2010 the phytomass of *E. canadensis* has changed from 56.54 to 398.04 g/m^2 on the south west coast, from 4.84 to 1996.15 g/m^2 on the west coast and 346.61 g/m^2 – on the north coast. In 2011 *E. canadensis* communities of the north coast has replaced *Chara fragilis* Desv. and *Myriophyllum sibiricum* Kom. The phytomass of *E. canadensis* in the south western part of the lake – 108.38–283.84 g/m^2, in the western part – 179.31–769.5 g/m^2. In 2012 pure communities of *E. canadensis* has been met only on the south west coast on the depth of 1.5–3.0 m (average phytomass – 74.5 g/m^2). In the west part only small spots of *E. canadensis* has been marked. *E. canadensis* (phytomass 6.42 g/m^2) communities appears in the water channel of the Total Energy Power Station.

In 2012, July the comparative analysis between *E. canadensis* and aboriginal species *Potamogeton pectinatus* L., *Potamogeton crispus* L., *Chara tomentoza* L. и *M. sibiricum*) of the submergent plants' phytocenosis and zoocenosis has been held.

E. canadensis phytocenosis epiphytes' composition includes equal diversity with other aboriginal plant species. The algal flora of all the researched species is mostly represented by diatom and green algae. The similarity index (the Serensen index) of the fouling algae which are marked on *E. canadensis* with other submergent algae changes from 0.2 to 0.6. Minimal similarity is marked for the pair of *E. canadensis* and *M. sibiricum* it is caused by more insipid composition of the cyanobacterium in the phytiepiphytes communities of the invaders. The Shannon's index of *E. canadensis* fouling algae communities is 3.2 bit/ind. (the Pielou's index is 0.9) it accords the indexes of the aboriginal species. The dominant complex of all the researched submergent plants is similar and represented by *Cocconeis placentula* (Ehrenberg) P. Cleve, *C. pediculus* Ehrenberg, *Epithemia sorex* Kützing, *Achnanthes lanceolata (*Brébisson ex Kützing) Grunow in Van Heurck. The algae number in the different plants' phytocenosis changes from 22 (*M. sibiricum*) to 2268 (*E. canadensis*) * 10^3 cell/L.

The zoocenosis of the *E. canadensis* invader is characterized by a wide species variety (the Shannon's index is 3.47 and the Pielou's index is 0.75). The community belongs to copepods with the dominating of *Mesocyclops leuckarti* (Claus). In the comparison aboriginal plants species zooplankton is less varied (the Shannon's index changes from 1.26 to 2.90, the Pielou's index – from 0.27 to 0.63). Copepods dominates in the zooplankton, only in the potomogeton thicket develops cladocera community with *Sida crystallina* (Müller). The quantity indexes of the hydrobionts in all the plant associations practically do not differ: 44–97 * 10^3 ind./m^3 and 243–1338 mg/m^3. The similarity analysis of the rotifers and crustaceouses fauna shows the propinquity of the plankton communities developed in 4 species of water plants (the Serensen index is 0.8).

So, the results of the observation of *Elodea canadensis* communities demonstrates the decrease of the overgrowth area and phytomass. Phytocenosis and zoocenosis of *E. canadensis* invsder in quality and quantity ratio have relatively insignificant diversities with the aboriginal plant species.

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THE LAST INFORMATION ABOUT DISTRIBUTION OF NEW FISH SPECIES IN THE CRIMEAN COASTAL ZONE (BLACK SEA)

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The problem of introduction of the alien and first of all highly tolerant aggressive alien species is extremely actual. As the analysis of scientific publications shows, appearance of the allochtonic species in the lists can be conditioned not only by objective, but by subjective reasons as well. The last can be conditioned by not sufficient knowledge about peculiarities of the systematic attribution, ecology, distribution of separate species or not correct citation of the literature sources. What is the real nowadays situation as for the alien marine fishes, found in the Black Sea coastal zone of the Crimea (the year of registration is shown after the species name) for the 15 – years studies period?

By the present time we can confirm complete naturalization of 9 species, 6 of which belong to the bottom fish and do not migrate considerably (Boltachev et al., 2009). *Gobius xanthocephalus* (2006) nowadays inhabited the rocky biotopes; in the region of Sevastopol and Tarkhankut cape it is not numerous, but usual. *Gobius cruentatus* (2002) can be met stably but not often near the Sevastopol region from the cape Tolsty to Balaclava. *Pomatoschistus bathi* (2000) created numerous populations at the sandy parts of the Sevastopol bays, in the Donuzlav lake (2008), near the Tarkhankut (2011), in less quantity it is met along the Crimean southern coast from the cape Khersonesus to the Foros town. *Parablennius incognitus* (2002) is common from Sevastopol along all the Crimean southern coast up to the cape Opuk. *Millerigobius macrocephalus* (2009) and the Far-Eastern endemic *Tridentiger trigonocephalus* (2006) formed local independent population, associated with mussels biocenosis, only in the Sevastopol bay. They do not observe distribution of these species off the bay, which possibly is connected with catastrophically depressed condition of the mussel habitats near the coast Of three near bottom species, *Sarpa salpa* (1999) and *Sparus aurata* (1999) were met near the rocky shores of the Sevastopol coast and sometimes in its bays; first of them is more numerous and they catch it as by catch in the coastal fishery. Recent finding of the local population of *Gammogobius steinitzi* in 2009 in the submarine caves of the cape Tarkhankut (Kovtun, 2012) is quite remarkable.

The other adventives fish species registered near the Crimea (Boltachev et al., 2009) have not yet formed any stable populations by the present time. The findings of *Syngnathus acus* (2006) were limited by three exemplars in the biocenoses of marine grasses in the upper part of the Sevastopol bay. Pelagic migrant *Chelon labrosus* (1999), regularly registered at warm time of the year approximately by the end of the first decade of XXI century is not marked in the last years, which can be connected with complexity of its catching or cycles of its coming to the Crimean shores. Singular findings of *Sphyraena pinguis* (1999), *Micromesistius poutassou* (1999), *Heniochus acuminatus* (2003) have not repeated any more, but penetration of the first of them into the Black Sea in future seems to be possible. *Chromogobius quadrivittatus* is represented by a single exemplary, found in 2012 in the submarine cave of the cape Tarkhankut (Kovtun, 2013).

There is a number of examples of unreasonable increase in number of advents in some publications. For example goby, initially identified as *Gobius auratus* further on was re determined as *G. xanthocephalus* (Vasil'eva, Bogorodsky, 2004), but in some works they give not one but both species (Shiganova, Öztürk, 2010). Two exemplars of barracuda, caught in the Balaclava bay were identified as *S. obtusata* syn. *S. chrysotaenia*, but then they were re determined as *S. pinguis* (Boltachev,2009), but in different lists of the Black Sea fish now we can meet from one name of these species to all three of them.

WOODY PLANTS INVASIONS INTO THE UPPER VOLGA NATURAL COMMUNITIES

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At present time invasions of alien plant species are become a global problem and may have serious evolutionary consequences (Lonsdale, 1999). Researches of alien woody invasions are so actually, because these plants transform the ecosystem structure irreversibly. Alien trees and shrubs are differed durability, fast growing, and have great reproductive potential and the most cenotic activity also.

The Upper Volga basin is one of the well industrially developed and urbanized districts of European Russia. Its current flora comprises 790 alien species, 119 of them are woody forms. 32 alien woody species successfully naturalized in region. 27 species invaded in to different types of natural communities with different degrees of disturbance. The majority of these species have been introduced in 1950 s as the ornamental plants. Some North American species (e.g. *Amelanchier spicata, Acer negundo, Fraxinus pennsylvanica, Physocarpus opulifolius*, ect.) escape from culture and invaded in to natural and semi natural communities. There are the most common and aggressive species in the region. Usually some fruit plants (e.g. *Grossularia reclinata, Malus domestica, Pyrus communis*, ect.) were found in the grass herb light forests, forest margins, glands near the town and rural settlements. *Caragana arborescens, Cotoneaster lucidus, Crataegus monogina, Crataegus nigra, Padus pensylvanica, Symphoricarpos albus, Rosa dumalis, R. rugosa, Sorbaria sorbifolia, Tilia platyphyllos* was found in the region forests seldom.

Populus alba, P. balsamifera form the large groups in the riparian habitats, especially in the sand alluvium. *Hyppophae rhamnoides* is widespread in open places are usually recorded in the water protection zone along the river banks.

Aronia mitschurinii is noted in the lake coast, forest glands and the last decades – in natural moss fogs. North American vines *Parthenocissus inserta* starts extending on the region. These species was recorded in the ravines on the river banks and in the light forests.

In Ivanovo oblast *Spirea pseudosalicifolia* was noted in the wetland. Some plentifully blossoming shrubs grew among the thickets from *Typha latifolia*.

Pinus strobus, Thuja ocidentalis were recorded in the coniferous forest near the big old park (Vladimir oblast).

The various natural factors (ex. birds, wind) promote the distribution and naturalization of the alien woody plants. The most diversity of alien woody species had noted in different types of suburban forest. However 14 species are recorded even for special protected areas. For example, 6 species are noted in the forests of Federal Klazminckiy zakaznik.

The urgency of organizing monitoring of invasive species and systems of conservation natural communities, especially forests is emphasized.

THE FEATURES OF COREGONID PALEOINVASIONS FOR CONTEMPORARY PATTERN OF THE COREGONID FAUNA OF THE NORTHERN RUSSIA

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As likely as paleoinvasions of coregonid fishes in Northern Russia took place several times and were associated with Pleistocene glaciations. Undoubtedly, these historical events altered freshwater habitats on an unprecedented scale. For coregonid fishes tremendous opportunities for dispersal over vast geographical ranges were provided. In different time invasions of coregonids in Northern Russia water bodies happened from different directions. So, Pleistocene glaciation events represent the major factors responsible for contemporary pattern of the coregonid fauna, especially for the phylogeographic structure existing in coregonid mtDNA. Interestingly, that different coregonid species can be characterized by different phylogeographic structure despite in many cases they colonized the same water bodies. It is concern to whitefish (*Coregonus lavaretus*) and ciscoes (vendace and/or least cisco), which are species from formerly glaciated region of the European North of Russia. Thus, in case of whitefish four major phylogenetic groupings were revealed. These groups most likely identify whitefish that survived glaciation events in several different refugia. At the same time ciscoes showed different phylogeographic pattern. The most abundant ciscoes E haplotype and its mutational derivatives were found in vast territory of the Northern Russia. Only more powerful analysis of the polymorphism within mtDNA E haplotype led to the recognition at least two ciscoes phylogenetic lineages originated from different refugia. For both whitefish and ciscoes of the European North of Russia a gene flow from Siberian populations was detected. In case of the ciscoes a gene flow to Siberia from periglacial refugium, which was probably located to south or southeast of the modern Onega Lake, was revealed. Nucleotide diversity of the ciscoes populations reduced with increasing latitude that corroborates previously data of Bernatchez and co authors (1991, 1998) for other fish groups. At the other hand nucleotide diversity pattern of the whitefish did not show good concordance with diversity vs. latitude relationships discussed by Bernatchez and co authors. This fact can be likely explained by possibility of the secondary contact among refugial groups of whitefish that happened after last glacial retreat. Indeed at present in many whitefish populations we detect mtDNA haplotypes of different phylogenetic lineages. At the same time specific nucleotide diversity pattern of whitefish permits to suppose several nonsimultaneous invasions of this species in freshwater bodies of the European North of Russia. Also one would predict that different geographic patterns of distribution exhibited by whitefish and ciscoes suggest their survival in different refugia during glacial advances. In addition dissimilar ecological characteristics and dispersal abilities of these species may have responded to events differently and result in different phylogeographic pattern. Altogether the data about coregonid phylogeography features permit the reconstruction of other species' phylogeography.

VARIABILITY OF MERISTIC CHARACTERS OF ALIEN FISH IN THE RESERVOIRS OF EUROPEAN NORTH EAST OF RUSSIA

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The settling of alien species is a unique opportunity to study the adaptation process of organisms to the new environment. For the last decades at least 10 fish species appears in the waters of the European North East of Russia as a result of acclimatization activities, occasional introduction or self distribution through artificial channels (Zakharov, Boznak, 2010). However, the morphological features of these species are studied insufficiently (Kuchina, 1967; Boznak, 2004; Boznak, Rafikov, 2009). We have analyzed the results of the study of morphological variability of the bleak (*Alburnus alburnus*) and verkhovka (*Leucaspius delineatus*), which were recently identified in the Pechora River basin, and Amur sleeper (*Perccottus glenii*), which was occasionally introduced in technogenic reservoirs of the Vychegda River basin.

The meristic characters value (and limits of its variability) of studied fish species usually meet their specific standards (Berg, 1949; Atlas ..., 2003), or slightly exceed these limits. Clear regularity in the changing of these parameters was not found. So the bleak from the cooling pond of Pechora Power Plant, compared to specimens from Vychegda river basin (natural range), is characterized by large number of gill rakers, fewer scales in the lateral line and rays in the pectoral fins. In verkhovka of the Pechora River basin the increase in the number of perforated scales in the lateral line and vertebrae (regardless of the temperature regime of the reservoir) was marked, but the increase in the number of transverse rows of scales, gill rakers and the number of rays in the pelvic fins was observed only in the cooling pond of Pechora Power Plant. Meristic characteristics of the amur sleeper from the Vychegda River basin, compared with fish from other reservoirs (as within the natural range and beyond) change without a clear regularity.

Average level of morphological polymorphism (μ), calculated on the 10 meristic characters, in some cases proved to be quite high. So at bleak caught from different parts of the Pechora Power Plant cooling pond the value of this index (2.76–3.26) for 12–32% is higher than in the sample collected in the middle reaches of the Vychegda river (μ = 2.45). Morphological variation in the amur sleeper (μ = 3.73) is characterized by similar values. Note that a noticeable increase in the level of morphological diversity in the samples of verkhovka from the Pechora Power Plant cooling pond (μ = 2.94–3.04) and floodplain lakes in the middle reaches of the Pechora river (μ = 2.89), compared with fish from Vychegda river basin (μ = 3.22), is not observed, what may be an argument for long time inhabiting of this fish species in the Pechora Basin.

Thus, the increasing of the morphological diversity level in the invasive fish species, with regard to different type of the studied reservoirs, is caused not only by abiotic conditions. Probably, a significant contribution to the observed pattern of morphological variability makes the limited (and random) set of individual genotypes on the basis of which the new population is formed. This is evident, firstly, the absence of a sharp increasing in the morphological diversity index in native fish species in cooling pond (bearded stone loach and ruff), and secondly, quite low and similar values of fluctuating asymmetry indexes characterizing the stability of fish early ontogenesis in the studied reservoirs.

THE SPATIAL AND TEMPORAL DYNAMICS OF PLANT INVASIONS IN THE FLATLAND PART OF UKRAINE

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Two types of anthropogenic transformation have been compared: flora of nature reserves and flora of agricultural phytocoenoses. These floras differ in terms of taxonomic composition and species richness as well as in terms of spatial and temporal aspects. Floras of agrophytocoenoses are spread throughout 68 72 % of the territory of the country, and its evolution has been lasting over the last millenniums. Its species richness does not exceed 20 % of the flora of Ukraine and the taxonomic composition is simplified. At the same time, the share of non native plant species exceeds 54%. During 80 years (Neichenko, 1927) the number of alien plants has reached 512 species, whereas over 14% of those are spread in all natural zones (Burda, Prydatko, 2005). The nature reserve fund of Ukraine occupies around 5% of its territory, and the period of reservation is not longer that 120 years. The species richness of this type of flora comprises about 85% of the flora of Ukraine, and the taxonomic composition is more representative compared to the flora of agrophytocoenoses. The published floristic lists of 23 localities have been analyzed. The distribution among the nature zones was the following: Mixed forests – Shatskyi and Desnyansko Starogutskyi NNP; Broadleaved forests – Yavorivskyi and Podilski Tovtry NNP; Forest Steppe – Golosiivskyi NNP, Kanivskyi NR, Ichnyanskyi NNP, Mychailivska Tsilyna NR and Gomilshanski Lisy NNP; Steppe – Buhgskyi Gard NNP, Yelanetskyi Steppe NR, Askania Nova BR, Svyati Gory NNP, parts of the Ukrainian Steppe NR (Kreidyana Flora, Kamyani Mohyly, Homutovskyi Steppe), parts of the Luganskyi NR (Stanychnoluganske, Provalskyi Steppe, Striletskyi Steppe), Dunaiskyi BR, Azov Syvashskyi, Azov Sea NNP and Meotyda NNP. The total number of non native plant species was 497 (60% of the total number recorded in Ukraine). The number of alien species in the locality varied from 42 to 274 (8–26%, average – 14%). Only three species are present in all sites: *Cichorium intybus* L., *Descurainia sophia* (L.) Webb ex Prantl and *Fallopia convolvulus* (L.) A.Löve. One third of the species were found only in one locality, in one fours of locatities were present 32 species (6%) and in the half of localities – 69 (14%). The number of species recorded in all nature zones was 93 (19%). The lowest number of non indigenous plants was observed in the steppe nature reserves, which have been under protection during the period around 100 years: Mychailivska Tsilyna, Kamyani Mohyly and Striletskyi Steppe. The greatest share of alien plants was in the reserves, where large areas were still under traditional natural resource use: Askania Nova BR – 26%, Gomilshanski Lisy NNP – 20%, Podilski Tovtry NNP – 18%. Expectedly high biological pollution was observed in dynamic Black Sea Azov Sea floras: Dunaiskyi BR – 17%, Azovo Syvashskyi NNP – 23%, Azov Sea NNP – 18%, Meotyda NNP – 22%.

The spatial and temporal dynamics of alien plant species in the flatland part of Ukraine fully corresponds to the pattern of natural anthropogenic migrations. The share of non native species in protected floras depends on anthropogenic factors (nature resource management type, prior to the protection, share of man made habitats in the landscape, mode and duration of reservation). The current system of protective actions as well as the system of nature reserve territories does not provide effective prevention of natural anthropogenic migrations. The alien plant species richness of the compared types of anthropogenically transformed floras are almost equal, however, their share in the floras of agrophytocoenoses is considerably higher. The share of non native plants in the floras of the nature reserves of less than 8–9% in these natural conditions can be used as the baseline for economic evaluation of plant invasion damage.

MORPHO-ECOLOGICAL CHARACTERISTICS OF THE NARROW-CLAWED CRAYFISH IN SOME WATER RESERVOIRS OF KRASNOYARSK REGION AND REPUBLIC OF KHAKASSIA

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For the recent years the narrow-clawed crayfish has been common for the suburban ponds of Krasnoyarsk City and the Bereshskoye Water Reservoir. It’s been found in some left-bank bays of the middle part of Krasnoyarskoye Water Reservoir and the ponds of Republic of Khakasia. The crayfish could get into the water reservoirs of Krasnoyarsk Regions either by introducing purposely by the amateur fishmen or occasional entry along with the young fish of carp while fish stocking.

Morphometric characteristics show that apparently the crayfish, *Astacus leptodactylus* Eschscholtz, 1823 was introduced into water reservoirs of Krasnoyarsk Region from the reservoirs and water streams of Western Siberia. It belongs to a subspecies of *Astacus leptodactylus cubanicus.* The narrow-clawed crayfish got into the water reservoirs of Republic of Khakasia from Krasnoyarsk Region.

The length and weight of the crayfish in the watersheds of Krasnoyarsk Region (the Bereshskoye Water Reservoir) are comparable to the similar characters of the crayfish found in the Azov and the Black Sea, Altai Region and north-western regions of the former Soviet Union. The number of crayfish found in Republic of Khakasia showed a slow growth. It is comparable with the crayfish growth in Republic of Karelia.

Comparing the proportion of the body segments to the full body length showed the differences related to the different growing speed of the narrow-clawed crayfish in the compared watersheds. Different size groups showed some characters’ fluctuation.

The narrow-clawed crayfish found in the Bereshskoye Water Reservoir fed on weeds, the seeds of water plants, imagoes of insects, zooplankton and zoobenthos. The crayfish of the Republic of Khakasia mostly feed on water plants, weeds and detritus, zoobenthos. Hornwort takes up to 70% of the whole food mass and is mostly frequently met. Some individuals showed up to 40% of animal food in the food amount. Imagoes of Coleoptera, Heminoptera, *Navicula* sp. in food prevail.

The basic winter food of crayfish in the ponds of Republic of Khakasia consists of detritus, the debris of water plants, weeds Bacillariophyta, oligochaetes, chironomidaes. The number of food items in winter declines to 12 items comparing to 32 items in summer. The food amount in winter declines from $14.7 \pm 2.3^{0}/_{000}$ down to $2.8 \pm 0.3^{0}/_{000}$ (males) and from $10.8 \pm 1.6^{0}/_{000}$ to $3.3 \pm 0.4^{0}/_{000}$ (females).

The crayfish of the studied water reservoirs do not show the considerable differences in fertility. The fertility of the crayfish in the researched water grows along with the growth of the body length. The crayfish is the supplement source of food for Krasnoyarsk Region and Republic of Khakasia. This fact raises the interest in crayfish farming in the regions.

INVASIVE SPECIES IN ICHTHYOFAUNA OF WATERBODIES IN THE NORTH-WESTERN PART OF THE AZOV BASIN

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Species composition of invasive fish species of the Azov-Black Sea Basin was described by a number of authors (Alexandrov et al., 2007; Invasive species in biodiversity …, 2010; Slynko et al., 2010). In these works the Azov Basin is considered as transit that provides no opportunity for now to determine the species composition of alien species directly for the sea and limans. The work (Invasive species in biodiversity …, 2010) made an attempt to estimate the species composition of invaders of the Sea of Azov and to characterize some fish species. However, analysing this work we should note that the list is incomplete and only species of Taganrog Bay are described. For this reason we tried to characterize peculiarities of invasion processes for fish of the region using literary data and our own studies.

The north-western part of the Azov Basin is represented by a system of big limans, bays and small rivers which are functioning under the conditions of considerable natural and anthropogenic transformations. Thus, for Eastern Sivash, Utliukskyi Liman, Malyi and Bolshoi Utliuk Rivers there are recorded regular release of the Dnieper waters through canals of North Crimean and Kakhovka irrigation systems. Molochnyi Liman was a testing area for acclimatization of the Far East So-iny mullet. Intensive fish-breeding works in basins of small rivers of the region have led to invasion of many alien fish species. Natural changes of salinity in the Sea of Azov contributed to penetration of many Black Sea and Mediterranean fish species in this water body. So, the water bodies of the north-western Azov Basin are characterized by complex invasion processes affecting the structure of ichthyocoenoses.

A total of 10 invasive species are recorded for the region. The most numerous of them are the So-iny mullet (***Liza haematocheilus***) and Prussian carp (***Carassius auratus gibelio***) which have formed self-reproducing populations and are actively used by fishery. The recently recorded species in the basin are the Chinese rice fish (***Oryzias sinensis***), stone moroko (***Pseudorasbora parva)*** and pumpkinseed (***Lepomis gibbosus***), the latter is the most intensively distributing in the water bodies of the region. On the one part this fact is assisted by the species wide valence to environment, on the other part – by human activity. In addition, many fish hatcheries in South Ukraine, contaminated with the pumpkinseed, assisted its distribution in other water bodies with planting stock. First records of this species are found in areas of water discharge of Kakhovka irrigation system into the Molochnaya River and later in the Malyi Utliuk River (Diripasko et al., 2008). As for the Sea of Azov, we for the first time recorded the pumpkinseed in Utliukskyi Liman in 2011 in the conditions of 11.9 ‰ salinity. We hold the view that further spontaneous distribution of the pumpkinseed depends on its number in river estuaries and the volume of river runoff.

RISK ASSESSMENT OF INVASION OF ALIEN SPECIES INTO EUROPEAN PART OF RUSSIA USING INFORMATION SYSTEMS

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The problem of biological invasions of alien species is one of the acute questions of many countries of the world for more than 50 years. This is connected with increasing integration of the whole planet mainly because human activity. The broadening and simplification of communications between different countries leads to active and passive transfer of alien species into new habitats, where they often get into conditions favorable for their spreading that result in displacement of local species and, finally, the change of entire ecosystems. Despite the fact that the most part of Russia is situated in the zone of temperate and cold climate, this country does not remain aloof from the global invasion process. Several circumstances favor of invasion process, from which the basic ones are:

1) extensiveness of the territory of Russia, which covers several biogeographic subdivisions;

2) absence of proper control for living organisms transfer within the country limits;

3) intensive freight traffic all over the country;

4) recurrences of the old policy of intentional introduction of plants and animals with the purpose of ecosystem productivity increase and diversification of products obtained from them;

5) poor development of corresponding legislation, etc.

The studies have showed that alien species colonize European part of Russia at the greater extent, the part where 78% of the country population lives and where the main thoroughfares and economic facilities are concentrated. This part of Russia has a most part of damaged and vulnerable for invasion ecosystems.

Taking into account the scale of invasion process, it is obvious that it is impossible to solve all the questions connected with alien species control even in the limits of territory of European part of Russia at once. In this connection, a special importance is gained by determination of priority target species and risk assessment for influencing the invasion process. This serves as a basis of ecological safety ensuring on the European part of Russia, the prevention of the expansion of alien species and the lowering of induced ecological and economical damage. The choice of the targets allows determination of priorities in invasion process regulation that gives a possibility to save money and materials and also to avoid liquidation of alien species which are not harmful for aboriginal ecosystem and carry out important functions in it.

On the basis of existing risk assessment methods with the use of available databases "Alien species of Russia" (http://www.sevin.ru/invasive/dbases/plants/species.html; http://www.sevin.ru/invasive/ dbases/insects.html, http://www.sevin.ru/invasive/invasion/mammals.htm, http://www.sevin.ru/invasive/ priortargets.html), literature sources (first of all: http://www.sevin.ru / invasjour /) and special studies carried out for the European part of Russia it has been determined 34 alien species, which can be priority targets for control. A list of these species from different taxonomic groups is shown below:

algae – pseud**o**nitzchia (*Pseudo-nitzschia calliantha* Lundholm);

vascular plants – Ash-leaved maple (*Acer negundo* L.); Sosnowski's hogweed (*Heracleum sosnowskyi* Mandenova); common ragweed (*Ambrosia artemisiifolia* L.); western (Cuman, perennial) ragweed (*Ambrosia psilostachya* DC.); great ragweed (richweed) (*Ambrosia trifida* L.); Russian knapweed *(Acroptilon repens* DC); Dodders (*Cuscuta* spp.);

insects **–** Colorado potato beetle (*Leptinotarsa decemlineata* Say); western flower thrips (*Frankliniella occidentalis* Pergande); fall webworm (*Hyphantria cunea* Drury), Gypsy moth (*Lymantria dispar* L.), potato tuber moth (*Phthorimaea operculella* Zeil.), Black pine-leaf scale (*Quadraspidiotus perniciosus* Comst.), phylloxera (*Viteus vitifolii* Fitch.);

aquatic invertebrates –fishhook waterflea (*Cercopagis pengoe* Ostroumov), comb-jelly (*Mnemiopsis leidyi* A. Agassiz*),* zebra mussel (*Dreissena polymorpha* Pallas*),* quagga mussel (*Dreissena bugensis* Andr.*),* veined rapa whelk (*Rapana venosa* Valenciennes*),* shipworm teredo Navalis (*Teredo navalis* L.), shipworm psiloteredo megotara (*Psiloteredo megotara Hanley);*

fishes – **A**mur sleeper (rotan) (*Perccottus glenii* Dybowski*),* rainbow trout (mikizha) (*Parasalmo mykiss* Walbaum*),* stone moroko (*Pseudorasbora parva* Temminck et Schlegel*);*

mammals – European (Eurasian) beaver (*Castor fiber* L.), Canadian (North American) beaver (*Castor canadensis* Kuhl); musk rat (*Ondatra zibethicus* L.*),* field mouse (*Apodemus agrarius* Pallas), house mouse (*Mus musculus* L.), common (brown, Norway) rat (*Rattus norvegicus* Berkenhout), black rat (*Rattus rattus* L.), domestic (stray) dog (*Canis familiaris* L.), racoon dog (*Nyctereutes procyonoides* Gray*),* American mink (*Neovison vison* Schreber).

The list of priority targets for control is presented for the discussion at the round table.

At present special studies are carrying out for every target species, all available information on their distribution, life-history peculiarities (preferable habitats, adaptability to abiotic and biotic environmental factors, feeding, growth, the time of achievement of maturity, fecundity, life span, minimal number for creation of a stable self-reproducing population, predators, parasites), the main invasion corridors and dispersion vectors, effects on aboriginal species and ecosystems, influence on the human health and human economic activity, population control methods is gathered and generalized. Besides, the analysis of ecosystem vulnerability is carrying out for ones which are not undergone the invasions of alien target species yet. With this purpose it is revealed the presence in a possible recipient ecosystem the essential for invader existence and reproduction abiotic environmental factors, additional food resources. It is also necessary to reveal the ecosystem disturbance degree and the level of self-regulation development. On the basis of these data it is possible to create the models of alien species invasion risks to the territory of European Russia. The great part in creation of the system of prediction and control of invasion process must be played by interactive databases.

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THE UTILITY OF SINGLE NUCLEOTIDE POLYMORPHISMS (SNPS) FOR IDENTIFICATION OF HYBRIDS AMONG NATIVE AND INVASIVE SUCKERS (PISCES: CATOSTOMIDAE) IN THE COLORADO RIVER ECOSYSTEM OF WESTERN NORTH AMERICA

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Numerous factors contribute to the decline of indigenous fishes in western North America. While habitat alteration is of major concern, impromptu introduction of alien species is a more serious threat to long term survival of indigenous fishes. Impacts of introgression are less immediate, and often go unnoticed by the general public. However, alien genes gradually erode the genetic integrity of native species, and irreversibly alter local genetic adaptation that have evolved over millions of years. As a result, indigenous genes become replaced and the endemic fauna is effectively eliminated. To examine this effect, we applied a molecular genetic approach to define the extent and magnitude of hybridization between the introduced White Sucker (*Catostomus commersoni*) and two endemic suckers of the Colorado River Basin in western North America, the Flannelmouth Sucker (*C. latipinnis*) and the Bluehead Sucker (*C. discobolus*). The three sucker species now hybridize in areas of the Upper Green and Colorado Rivers, where White Sucker has been introduced. Species specific nuclear markers were developed so as to assess the status (i.e., pure or hybrid) of over 800 specimens. SnapShot (multiplex primer extension) PCR reactions were used to screen 10 diagnostic SNPs (single nucleotide polymorphisms) that could correctly distinguish the three species. Results demonstrated that genotypic identifications could be manifested morphologically as well, and that results were largely congruent among 95% of individuals examined. Further, non native fishes and hybrids were found to be more prevalent in those riverine areas with perturbed habitat.

INTROGRESSIVE HYBRIDIZATION IN RIO GRANDE CUTTHROAT TROUT (*ONCORHYNCHUS CLARKI VIRGINIALIS*): ENVIRONMENTAL, GEOGRAPHIC AND HISTORIC CONSIDERATIONS

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The unanticipated and deleterious effects promoted by alien species introductions are increasingly recognized as a serious threat to indigenous species assemblages. Predation is most visible and apparent because its impacts are immediate and severe. Competition can also promote indigenous species declines, particularly when natives and exotics overlap ecologically. Further, exotics can gradually eliminate indigenous species through introgressive hybridization. While the latter occurs slowly and over longer periods, it is equally as devastating as predation and competition. Introgression is particularly germane to loss of native trout in western North America, where non native Rainbow Trout (RBT: *Oncorhynchus mykiss)* or Yellowstone Cutthroat Trout (YSCT: *O. clarki bouvieri*) have replaced native Rio Grande Cutthroat Trout (RGCT; *O. c. virginalis*) in 90% of the latter's historic distribution. Recovery efforts now focus on maintenance of genetically pure populations. To facilitate this, 1,000 RGCT sampled from 50 populations (avg. 22 individuals/ population) were evaluated across the range of the species so as to determine % introgression with RBT and YSCT. Three sets of diagnostic nuclear markers were screened: a total of 8.662 bi allelic markers, diagnostic for either Cutthroat Trout or Rainbow Trout; 32.756 PINEs (Paired Interspersed Nuclear Elements) diagnostic for RBT, and 26.054 PINEs diagnostic for YSCT. Introgression by RBT exceeded >10% and >1% in each of 4 populations, whereas introgression YSCT was >10% in 1 and > 1% in 5 populations, respectively. Locality information and environmental parameters were statistically evaluated against historic and contemporary genetic relationships. Populations revealed an isolation by distance pattern, suggesting historic population structure. However, environmental parameters were not associated with levels of introgression, suggesting stocking history as the best predictor of introgression levels.

ALIEN SPECIES IN KAZAKHSTAN ICHTHYOFAUNA

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There are 149 species in the Kazakhstan ichthyofauna, reported in the literature. Among them, 27 species (18%) – alien to the water reservoirs of the republic as a whole, and only 12 species of these were introduced intentionally. The remaining 15 species (10%) were found here either in connection with self dispersal, like eel in the Ural Caspian basin, like black Amur bream, bitterling, snake loach, which penetrated into the Kazakh part of the Ili River basin, or from China, or in many cases were brought by chance, due to an oversight at transportation of herbivorous fish.

Most invasions occurred in the 1950–1970 s and some of them gave positive economic result (whitefish, silver carp, grass carp, flatfish), without causing significant displacement of the natives. There are quite ambiguous results of naturalization of valuable predatory fish – rainbow trout, catfish, pike perch, snakehead who occupied a prominent place in the fishery at the cost of aboriginals or previously domesticated species. Many introductioners, being of little value, often "coarse" species, have made significant changes in ichthyocenosis. This, in particular, are abbottina, sawbelly, bitterling, medaka, Amur sleeper, Amur stunned fish, eleotris, Chinese bullhead. All the pools, especially the southern ones, are under their expansion.

Radical reconstruction of the ichthyofauna the Balkhash Ili basin underwent. In the past, it showed poverty of ichthyofauna, which included only 12 species, and a significant degree of endemism (Schizothorax argentatus, Barbatula labiata, Nemacheilus sewerzowii, Perea schrenki). Over the last century the composition of the basin's ichthyofauna has more than tripled and now there are about 41 species within the territory of Kazakhstan. Out of 29 new for the basin species, 17 are alien to the whole country. The native species didn't manage to sustain such a press of the introduced species. Being previously numerous, and some of them making up substantial share in the fishery (marinka, perch, spotted gubach), they have drastically reduced their quantity and area, were pushed out of the lake Balkhash and Ili River to the basin's periphery. Ili Balkhash perch population and Ily Marinka subspecies were eventually included in the Red List of Endangered species of Kazakhstan (1991), and other endemic with two species of minoow in the Red List of Endangered species of the Almaty region.

The disastrous decrease in the population of Severtzov's stone loach is demonstrative. In 1930 in the estuary of Kaskelen River (Ili River confluent) it was very numerous, and during the research works in 2003–2010 there were caught only 5 fishes (!) of this species (Mamilov et al., 2011).

Similar thing happened in the basin of Talas River, aboriginal ichthyofauna of which consists of 8 rheophilous species of fish only, some of which (dace, marinka) were abundant in the lakes as well. As a result of long term "reconstruction" 18 new species of fish came here, 11 of which are alien to the country. Now, aboriginals of the basin are preserved only in the foothill areas.

Ichthyofauna of Chu River basin has suffered from the invasion of exotic species relatively less due to the large number of native species (25), resisting the pressure of aliens (16 species), 12 of which are new to the country. However, even there both species of barbs and endemic ostroluchka listed in the Red Data Book of Kazakhstan (1991), and Siberian dace and Marinka were dropped out of the ichthyofauna. Catfish and river perch yet preserved in the lower reaches of the basin have reduced their population.

The same number of alien fish species (16) fell in the Syr Darya River basin (without Sea) in the country, but here less than half of native species (33) were found, that have prevented many of the exotic species to explosively increase the number. Only abbottina, sawbelly and stone morocos have spread over the Syr basin widely and numerous. Of target species there are grass carp, silver carp and snakehead.

ABOUT THE INVASION OF THE DWARF ALTAI OSMAN (*OREOLEUCISCUS HUMILIS* WARPACHOWSKI, 1889: CYPRINIDAE) IN THE BASIN OF THE SELENGA RIVER

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The dwarf Altai osman was considered endemic for the drainless basin of Central Asian Inland. However the last data on distribution of species are changed considerably, so this might alter the zoogeographical division of fish in Mongolia. Now the dwarf Altai osman is recorded from the basins of three large rivers of Mongolia, such as Tuul, Selenge and Orkhon.

In 1972, for the first time the population of the dwarf Altai osman is found by Kh.Munkhbayar from the river Tarniin Gol, which is tributary of Tuul river (Davaa et al., 1976). In that time, some of our collected specimens was presented to the leading ichthyologist of Mongolia, who is professor A.Dashdorj and also some parts of our specimens is given to Zoological museum of National University of Mongolia. About twenty seven years later in 1999, the dwarf Almai osman is found in the river Khuytny-Gol of the basin of the river Selenge river (Dgebuadze et al., 2003), in 2004 it is found from the river Zegestein Gol which is in basin of the Orkhon river (Dulmaa et al., 2004). And also populations of the dwarf Altai osman found in the Khag lake (middle tributary of the Selenga River), river Khar-bukhiin (the basin of the Tuul river), the lake Sangiin-Dalai (basin of the Orkhon River), and Havtsaliin river and Hogshin-Orkhon (Slynko, Dgebaudze, 2005).

In 2000, Mongolian and Korean joint expedition carried out complex research work in Khogno-khaan and published the book entitled as “Ecosystem and biodiversity of Khognokhaan Nature Reserve, Mongolia”. In this book, authors are recorded *Phoxinus sp* from the area of Shiluut and Tarna rivers. (Odonchimeg, Yeong-Mok, 2000). We think that this might be the dwarf Altai osman and not a species of *Phoxinus* sp.

Thus, the dwarf Altai osman is relatively young, growing rapidly, and their distribution area is expanding to the north by their natural way, and this process undoubtedly affected by the tendency of the general climate warming. We assume that the center of radiation for the dwarf Altai osman is the lake Sangiin-Dalai, which is in the border of two basins of Selenge river basin and Central Asian Inland basin.

THE LIME MINER *PHYLLONORYCTER ISSIKII* KUMATA (LEPIDOPTERA, GRACILLARIIDAE) IS AN INVASIVE SPECIES IN EUROPEAN RUSSIA

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Among the miner species presently involved in biological invasions in Europe, the lime leafminer is characterized by the highest rate of expansion, reaching 110 km per year. For comparison, the range expansion rate is 15 km per year in *Phyllonorycter platani* (Staudinger, 1870), 60 in *Ph. leucographella* (Zeller, 1850), 20 in *Ph. medicaginella* (Gerasimov, 1930), and 60–70 km per year in *Cameraria ohridella* Deschka et Dimic, 1986 – 60–70 км в год (Šefrová, 2003). In our opinion, the exceptional rate of expansion of the lime leafminer can be accounted for by a combination of several factors.

First of all, expansion of this species is facilitated by the widespread occurrence of lime trees in Europe. The range of only one lime species, the small leaved lime ***T. cordata*** Mill., is 118 mln km^2 (Ivanov, 1975).

Besides, the miner is subject to almost no control from representatives of the third trophic level. In our research carried out in Izhevsk in 2001–2005, the rate of parasitoid infestation of the first generation of the miner was estimated at 0.5 to 13.7% (Ermolaev at al., 2011). A significant correlation between the population density of the moth larvae and the rate of their infestation was found in only 2 out of 15 cases (3 plots monitored for 5 years); in one case the correlation was negative, in the other, positive. A significant fraction of the larvae (up to 37%) died in the mines from unknown causes. Thus, the general survival rate in the moth generations varied from 53.2 to 81.7%, depending on the season. Owing to low mortality, the miner can rapidly increase its infestation density of plants in the new habitats.

Finally, the high rates of biological invasion may be related to the specific dispersal traits of the species in question. It is commonly known that microlepidopterans disperse passively, mostly by wind, whereas the active flight range of miner moths usually does not exceed several tens of meters. For example, adults of the poplar miner *Phyllonorycter populifoliella* (Tr.) were able to fly as far as 50 m away from their food plants in search of shelter (Belova, Vorontsov, 1987). The lime leafminer is unique in the fact that changes in the density of the host tree infestation affects the ratio of intrapopulation forms, increasing the fraction of dark colored individuals which have longer wings and higher potential fecundity. Individuals with longer wings may be more easily carried by wind and may thus disperse over greater distances, whereas higher fecundity determines successful colonization of new territories.

Outbreaks of *Ph. issikii* negatively affect the productivity and reproductive parameters of lime forests, creating a direct threat to the efficiency of beekeeping in the region (Ermolaev, Zorin, 2011). The results obtained indicate that the lime miner can be included into the group of economically important phyllophages of lime, whose populations should be monitored.

NON INDIGENIOUS INVERTEBRATE FAUNA OF SOUTHEASTERN BALTIC: THE INVENTORY ANALYSIS OF COMPOSITION ABD FORMATION IN REGARD OF PECULARITIES OF AQUATIC SYSTEM

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The percentage of successful introductions, both intentional and unintentional, in the Curonian and Vistula Lagoons and sea coastal zone of the Kaliningrad region is quite high. The first published records of alien species relate to the first third of 19th century. Over two recent centuries, the process of dispersion of non indigenous species has markedly intensified in global scale. One or more new invaders is recorded in the Baltic Sea almost each year since the 1950s. The given paper is dealing with an inventory of non indigenous invertebrate fauna of the Russian South Eastern Baltic (SEB).

It was registered 32 alien invertebrates species I the area of interest. In the Curonian Lagoon 18 species were ever recorded, 12 can be regarded as established (naturalized) ones. In the Vistula Lagoon 25 alien species were recorded, and 22 of them become established. In the Russian waters of the SEB, there are 14 invasive species, all naturalized. Thus, the proportion of successful introductions is very high 67% (Curonian), 88% (Vistula), 100% (SEB) of those registered. The main donor regions of alien species for the area, as well as for the entire area of the Baltic Sea, are the areas of Ponto Caspian basin and the Atlantic coast of North America. Species of other zoogeographic origin (South Eastern Asia, Indo Pacific region, Southern Europe) are not numerous in an alien fauna.

In order to assess the vulnerability of lagoon ecosystems and SEB for invasive species, the following indices were calculated: "Taxonomic Contamination Index", the ratio of the number of taxa of native and alien species, (TCI, %); "Abundance Contamination Index" ratio of the number of alien species and the total number of communities (ACI, %) [Arbačiauskas at al., 2008], "Biomass Contamination Index" biomass ratio of alien species and the total biomass of the community [Kurashov et al, 2012]. It was found that the risk of invasions in the Vistula Lagoon is the highest.

In small shallow brackish lagoons of the Baltic Sea, such as the Vistula and Curonian Lagoons, the ecosystem role of invasive species is usually very important. Some invasive species (*Dreissena polymorpha*, *Marenzelleria neglecta*, *Cercopagis pengoi*) are important food items for commercially valuable fish. Some representatives of non indigenous fauna (***D. polymorpha, M. neglecta, Rangia cuneata***) belong to ecosystem engineers because can influence the rate of biogeochemical processes in the benthic boundary layer: some can serve as a vector and intermediate host of parasites (***Gammarus tigrinus***); others (***Rhithropanopeus harrisi tridentatus, Eriocheir sinensis, C. pengoi***) competed for food resources with native fish and invertebrates.

Keeping in mind the current structure of the non indigenous fauna of both lagoons, the extensive network of channels connecting the Caspian and the Black Sea to the Baltic, intensive shipping and disregarding the Convention on ballast water in practice, it should be expected that, if prevailing climatic trends will persist, the impact of the Ponto Caspian and other thermophylic species in the Baltic ecosystem shallow lagoons will be increasing in the coming years.

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COMBINED EFFECTS OF FOOD ABUNDANCE AND TEMPERATURE ON LARGE BODIED VS SMALL BODIED CLADOCERAN SPECIES REPLACEMENT

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Cladoceran species are often used as model species in the studies of mechanisms of successful introduction of alien species in the new environment. Temperature and food abundance are known to be important factors responsible for cladoceran species success in the community, but the combined effects of these two factors on large and small bodied cladoceran species are not well understood. Large and small cladoceran species represent two different ecological groups differing in life survival strategies. The aim of the study was to determine how species composition and biomass of cladoceran communities varied in dependence of the combined effects of temperature regime and food conditions. Three eutrophic Polish lakes located close to each other, yet, differing in temperature regime were under study. There is potential exchange of species between the lakes, however their species composition was different. In the heated Lake Lichenskie large bodied *Daphnia sp.* were absent during the warmest period in July and they constituted only 4% of the total cladoceran biomass at lower temperature in late summer – early autumn. Cladoceran community in this heated lake in July was represented only by three small bodied species *Ceriodaphnia reticulata* (Jurine), *Diaphanosoma brachyurum* (Liéven), and *Bosmina longirostris* (O.F. Müller). In the other two colder lakes (Skulska Wieś and Ślesińskie), *Daphnia* sp. contributed much more to the total biomass of the cladoceran communities and species richness was higher than it was in the heated lake. Analysis of phytoplankton suggests that cyanobacteria did not suppress *Daphnia* as the highest relative abundance of *Daphnia* was observed in Skulska Wieś which also had the highest relative abundance of cyanobacteria. There was also no indication that food depletion was greater in the heated lake than it was in the other two lakes. The mortality of cladoceran species in all studied lakes was not related to food deficit as fecundity was high providing evidence that there were sufficient food resources for reproduction and hence for survival. We suggested that there may be a direct effect of temperature that was responsible for species composition in these lakes. For estimation of the effects of temperature at various food conditions, a set of laboratory experiments with competing large and small cladoceran species was conducted at different temperatures and resource levels. Small bodied species were found to replace large bodied species under the enhanced temperature and lower food supply, yet, when temperature goes down and food abundance increases, superiority shifts to large bodied species. The mechanism of such shift is shown to be associated with the different response of the ingestion rates to the changes of temperature in small and large bodied species in an additional set of experiments. This mechanism of species replacement along environmental gradients helps to sustain the total biomass of cladoceran communities throughout a season. Thus, introduction of newcomers in the community may be an adequate response of the community to the changes of temperature and food conditions.

SOME BIOLOGICAL CHARACTERISTICS OF POPULATION *GMELINOIDES FASCIATUS* (STEBBING 1899) IN THE IRIKLA RESERVOIR

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The Irikla Reservoir is the largest in the region over the South Urals. It was organized in the upper flow of river Ural in 1960. The Baikal *Gmelinoides fasciatus* (Stebbing, 1899) were introduced into it thirteen years later. Installation of the crustacean was being done since 1973 till 1976. Researchers of the zoobenthos (Grandilevskaya – Deksbakh, Yeremenko, Shilkova, 1978) informed of registering *G. fasciatus* in 40 km from the point of letting out during the period of acclimatization, and Gammaridae without mention of species of mature and young individuals in the area of installation in June 1978. Later up to 2010 there was no mention of the development of the introduced species in the given reservoir in the literature sources known to us.

As the result of the monitoring studies which were being carried out by us since 2009 till 2012 the fact of naturalization of *G. fasciatus* in the Irikla Reservoir was determined. Peculiarities of introduced species ecology in conditions of the mountain-plain type reservoir were studied (Filinova, 2010–2012).

Analysis of structure of the *G. fasciatus* population according to size and sex with use of data taken during vegetation periods in 2010–2012 allowed clearing out some peculiarities of biology of the given introduced species in the Irikla Reservoir.

In the end of May at the temperature of water 11.9–12.4ºC population of *G. fasciatus* consisted of individuals with size 3.7–9.5 mm. Females became able to reproduce when they reached the length of 4 mm. The length of females did not exceed 7 mm, males – 9.5 mm. Maximum quantity of females with just laid ova were in size 4.2–5 mm, with formed embrions– from 6.5 to 7 mm. Quantity of ova in marsupium varied from 1 to 15. Group of females with size 6–7 mm passed ahead in pubescence females with smaller linear size.

In June–July temperature of water reached 21–26ºC. Maximum quantity showed juvenis (1.5–3 mm in size). In this period females with length 4–8 mm bearing from 4 to 32 ova were registered. Also were registered eliminated male individuals with length 11 mm.

In October–November at temperatures 5.9–11.6ºC population consisted of individuals with sizes 3.5–9 mm. Youth with sizes less than 3.5 mm was not found. All females had empty marsupiums. The most numerous was the part of population with linear sizes of crustacean 4–7 mm stages.

In the period of reproduction correlation of males and females was 1:1.5. Average fecundity of females in summer period was twice more than in the beginning of vegetation season.

Analysis of structure of population of *G. fasciatus* according to size and sex, as well as analysis of data taken from literature about duration of development at different stages of ontogenesis (Mataphonov, 2003; Berezina, 2004; Barkov, 2006), allows to determine that spawning of juvenis of the given species of Gammaridae in the Irikla Reservoir begins in the end of May. The period of reproduction is prolonged and completes in August. Population consisting of individuals of this year of different sizes from spring-summer spawning survives in winter period and enters of reproductive process in next vegetation season.

The differences between investigated characteristics of introduced species in the recipient water body and donor water body (Bazikalova, 1945; Beckman, Bazikalova, 1951; Beckman, 1962) may be the result of higher summer temperatures of water and elongated vegetation period.

INVASIVE SPECIES IN ZOOBENTHOS OF RESERVOIRS OF LOWER VOLGA

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Numerous works focused on investigation of distribution and the role of introduced species in benthos of the Reservoirs of Saratov and Volgograd which are called the Reservoirs of Lower Volga (Ioffe, 1968; Belyavskaya et al., 1969; Mordukhay-Boltovskaya et al., 1974; Zintchenko, Antonov, 2005 and other). Retrospective analysis of publications concerning this subject and of author's researches for many years period at the turn of the XX–XXI century has been carried out (Filinova, 2010, 2012).

The water bodies under study are large plain reservoirs of channel type. Common hydrological and morphometric parameters of the Reservoirs of Lower Volga, as well as their geographic position to a certain degree resulted in common processes of transforming benthos under conditions of lowered flow which are favorable for introduction into the given water bodies the fauna of estuary complex. These reasons, mentioned above, as well as historical bounds of distribution of species of ponto-caspian origin in the Volga basin resulted in wide diversity of this hydrobiontic group in the given water bodies unlike reservoirs situated upstream the Volga Cascade. Introduced species make about 16% of the whole number of species of benthic fauna in each of them. Among the naturalized species the malacostraca which have taken place of the aboriginal species in the most biocenoces are represented most widely. Though general quantitative indices of development for this group of invertebrates in the reservoirs have not grown.

Dynamics of distribution of the most mass species of mysidacea and molluscs ***Adacna colorata*** (Eichwald, 1829) preferring sand-silty types of ground, which had naturalized in the Reservoirs of Lower Volga during the initial period of silting of the river-bed has been analyzed. This analysis has shown that their populations have significantly decreased in number under the present conditions of continuing silting of the river-bed and now they exist in suppressed state. Widely adaptive molluscs – ***Dreissena bugensis*** (Andrusov, 1847) and polychaeta ***Hypania invalida*** (Grube, 1860) preferring silty grounds appeared to be in more favorable conditions. So invader ***D. bugensis*** (Andrusov, 1847), dominates in zoo benthos of most biotopes of the reservoirs under study and makes more than 80% of general quantitative indices and more than 99% of biomass. ***H. invalida*** (Grabe, 1860) for many years has been taking the leading position in the soft zoo benthos. In this decade this invader in the Saratov Reservoir makes from 10 up to 30% of quantitative and biomass indices of soft zoo benthos. In the Volgograd Reservoir the given species is a planned introduced species, within the indicated period it makes from 16 to 40% of quantitative and biomass indices of soft zoo benthos.

Many years of research resulted in the conclusion that the maximum diversity and quantitative development of introduced species was characteristic of the river-bed section of the Reservoirs namely of medial part. And beginning with the late 1990s, it became characteristic also of shallow waters near banks covered with vascular water-plants (VWP) (Filinova et al., 2008). They were noticed in channels and shallow waters behind island occasionally in the period of flood, were not found in the flood lands which are situated far from the stream of the Reservoirs. The last decade is remarkable with spreading malacastraca of ponto-caspian fauna in channels and flood lands under the water surface on the biotopes not covered with plants and over grown with VWP (Filinova, Sonina, 2012).

Thus, biological invasions in the Reservoirs of Lower Volga accelerated reconstruction of structure of zoo benthos in channel part of the Reservoirs and resulted in domination of adventive species in them. At the present moment introduced species have been occupying ecologically different in type areas of shallow waters.

INVASION OF *GMELINOIDES FASCIATUS* (STEBB.) IN THE SHEKSNINSKOE RESERVOIR

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Gmelinoides fasciatus (Stebb.) is a representative of the Baikal Amphipoda which was spread in a number of basins in the European part of Russia after its artificial introduction. Among the Benthos communities of the Vologda region *G. fasciatus* is significantly represented in the Sheksna river, Beloe lake and in the water-reservoirs of the Vytegorskaya hydrosystem, such as the Belousovskoe, Novinkinskoe and Vytegorskoe reservoirs. Besides, some single finds of *G. Fasciatus* in the Suhona river were registered. In 1973–1974 in order to increase the productivity in Lozsko-Azatskoe lake two millions pieces of *G. fasciatus* larvae were released .Therefore, there are two possible ways of *G. fasciatus* emerging in the Sheksninskoe reservoir: either from the Gorkovskoe reservoir or from Lozsko-Azatskoe lake.

The data on the *G. fasciatus* occurrence in the Benthos communities of the Sheksna reservoir was obtained by collecting the macrozoobenthos organisms during the hydrobiological researches in Beloe lake (2010–2010, october) and in the Sizma spate (may, september). Some data was obtained in different parts of the Sheksna river (june), in the waters of the North Dvina Water System and the Vytegorskaya hydrosystem (jule). In the near shore part the data was collected with the bottom sampler GR-91, in the littoral - with a Peterson grab. In the rocky ground washouts were implemented.

The highest numbers of *G. fasciatus* appeared in Beloe lake (6857.4 spec./m^2, 21.1 g/m^2). Relatively high rates were also registered in the headwaters of the Sheksna river close to the village Krohino (2175.3 spec./m^2, – 6.2 g/m^2). Then, towards the watergate in the Sheksna village the rates are decreasing in the village Topornya area (728.4 spec./m^2, 0.5 g/m^2) and in the Sizma spate area (478.2 spec./m^2, 0.4 g/m^2). In the swampy influx of the Sizma river the Amphipoda numbers were 321.0 spec./m^2 and the biomass 1.4 g/m^2.

The largest percent of *G. fasciatus* in the Benthos communities samples was found in Beloe lake (17.7% of abundance and 36.3% of biomass). These rates are considerably lower than those we had found in the near shore biotops of the Vytegra river (46.2% of abundance and 80.0% of biomass). Also high proportion of *G. fasciatus* in Benthon communities was found in Siverskoe lake (49.8% of abundance and 65.1% of biomass) where the washouts were made.

In the Beloe lake littoral the highest numbers of *G. fasciatus* were found in a stony ground and in the lots with a detritus. In the deep water samples it was not found. At the same time during the hydrobiological researches in the Sizma spate *G. fasciatus* was detected along the waterway at depths of more than 8 m. It was determined that in the river part of the Sheksninskoe reservoir *G. fasciatus* prefers reeds and canes.

Therefore, on the territory of the Vologda region *G. fasciatus* can be found today in all the basins of the Volgo-Baltic Water System. Outside this territory the Amphipoda was detected in the North Dvina canal and in the Suhona river. In Kubenskoe and Lozsko-Azatskoe lakes it was not found though in the latter it was released in 1973–1974.

TEMPERATURE ADAPTATIONS OF FRESHWATER FISH: ALIEN AND NATIVE SPECIES

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Numerous studies are devoted to the relationship between alien and native fish species. However, the comparative aspects of ecological and behavioral, physiological and biochemical characteristics of alien and native species have been studied poorly. The studies on adaptations of various alien species to the water temperature as one of the most important environmental factors which affects growth, development, feeding, behavior and distribution of fish are fragmentary. In recent decades, an increase in the number of zones of thermal pollution, abnormally high temperatures in summer and climate warming have contributed to changes in the water temperature of fish habitats. Therefore, the information on the optimal and upper lethal temperatures of habitats both of alien and dispersing species is of great importance.

The temperature characteristics of vital activity of 15 fish species found in the Upper Volga region, in particular, their upper lethal temperature (ULT), final preferred temperature (FPT) and the temperature range in their habitats have been analyzed (Golovanov, 2013). Seven of the species (bream, roach, perch, ruffe, ordinary minnow, stone loach, and burbot) are native ones and eight species (carp, goldfish and crucian carp, amur sleeper, tuylka, smelt, tubenose and bighead) are alien or relatively alien species. All species recorded in the region are subdivided into 4 groups according to the temperature characteristics: highly thermophilic (1), thermophilic (2), moderately thermophilic (3) and cold loving (4) species. Alien species were recorded in the first group (amur sleeper, tuylka), in the third group (gobies) and in the fourth group (smelt), but they were absent in the second group.

The increase in the water temperature in the Rybinsk reservoir in summer and autumn 1997–2008 (Litvinov, Zakonnova, 2012), probably promoted the introduction of tuylka. Tyulka occupied the ecological niche of smelt which almost had disappeared by the beginning of the 21th century, because of relatively high water temperatures in summer. The upper temperature limit of smelt habitats is ~ 27ºC that partly explains a sharp decline in its abundance.

Abnormally high temperatures during a long period in the summer of 2010, apparently led to the oppression of cold loving species such as burbot. At the same time, it was determined that individuals of some species (ruffe, perch), more sensitive to the lack of oxygen can hardly survive under such conditions. The temperature limit, above which the vital activity of fish decreases, is ~ 30–32ºC for thermophilic species, and ~ 23–25ºC for cold loving species. It should be emphasized, that different fish infections, as well as the impact of some anthropogenic factors lead to the decrease in the ULT value of fish. In the areas of thermal pollution subjected to the impact of discharges of heated water of hydropower plants, nuclear power plants and large industrial enterprises, the number of which increases constantly in fresh waters, the ecological risk of exposure to abnormally high temperatures increases dramatically. Changing temperature conditions in habitats of freshwater fish should be taken into consideration when assessing the relationship between native and alien species.

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ELODEA CANADENSIS L. IN RESERVOIRS OF THE BASHKORTOSTAN REPUBLIC

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The problem of invasions of water alien plants is actual both for sea and for fresh-water ecosystems. Introduction of neophytes in water communities is promoted by an eutrophication of reservoirs, decrease in a specific variety and structure change of phytocenosis, connected with disturbance of the water environment. Water communities are open for invasion into force of the nature.

In the conditions of a moderate zone, fresh-water ecosystems litter, mainly, aggressive North American alien species of genus Elodea. 3 species of this genus were widely settled over the last 50 years on reservoirs of Europe, northern Asia and Australia (Chambers et al., 1993, Tabacci, 1995, Sand-Jensen, 1998, Germplasm …, 2008, etc.).

Elodea canadensis L. (*Hydrocharitaceae*) – North American hydrophyte, widespread on many continents, including in Eurasia. Expansion of *Elodea canadensis* in the Old World happened, thanks to aquarians. In Asian part of Russia and in the Urals *Elodea canadensis* for the first time was introduced in 1892 in reservoirs of Yekaterinburg, from where in the next 10 years quickly extended across all Ural (Ronzhina, 2006). Communities with participation of *Elodea canadensis* were repeatedly described in different native zones of the Bashkortostan Republic (Grigoriev, Solomeshch, 1987a; Petrov, Onishchenko, 1991; Hilbig, 1991; Baktybayeva, 2009; Golovanov, etc., 2011). For today the geobotanical database of communities with participation of this look includes 215 releves.

Communities with domination of this alien plant are widespread in reservoirs of Bashkortostan, from 1986 to 2012 they were marked out in 11 areas of the republic. According to ekologo-floristic classification of the Braun-Blanquet (Braun-Blanquet, 1964) this communities take to ***Elodeetum canadensis*** Eggler ex Passarge 1964 association, the ***Potamion pectinati*** union (W. Koch, 1926) Oberdorfer 1957, order ***Potemetalia*** W. Koch 1926 and class ***Potametea*** Klika 1941. Communities of association are widespread most often in silent lakes and former river-beds, in river creeks with rather slow current, mainly with oozy soil, with depths from 0.1 to 1.5 m. On well warmed up habitats such communities can fill all thickness of water. The floristic structure of association totals 4-10 species, on the description area from 2 to 25 sq.m. TPC varies from 80 to 100%.

The analysis of floristic structure of this association in the Bashkortostan Republic showed that in the conditions of lakes and river the raises a share freely floating on a surface and in the water thickness of species of the class ***Lemnetea*** R. Tx. ex de Bolòs et Masclans 1955 (*Ceratophyllum demersum, Hydrocharis morsus-ranae, Lemna minor, L. trisulca, Spirodela polyrhiza*), and a share of pondgrass (*Potamogeton pectinatus* and *P. perfoliatus*, etc.) is falls. The return process is noted for calm sites of the rivers. Similar distinctions in floristic structure of the association are expressed by us in two variants: ***Potamogeton perfoliatus*** (it is characteristic for river habitats) and ***typica*** (it is characteristic for habitats of lakes and former river-beds).

Except these communities, *Elodea canadensis* in Bashkortostan is a part of many other water communities, it meets in 21 associations and 6 unions of classes ***Lemnetea*** and ***Potametea***.

Thus, it is possible to note that lately *Elodea canadensis* became one of the most usual water activities of plants in the Republic of Bashkortostan and meets in many types of water vegetation. Control of an invasion of this alien plant is almost impossible.

THE ROLE OF INVASIVE SPECIES IN THE BRYOZOA FAUNA OF THE CHUCKCHEE AND BERING SEAS

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The Chuckchee Sea is the most eastern sea of the Siberian seas and it is situated on the shelf outside the Arctic Circle. It is real Arctic sea with the Arctic fauna and flora. Bottom flora is distributed beginning from 5–8 m depths. The Wrangler Island is a fragment of ancient isthmus with unique evidences of an existence of the Beringia, which is loosely defined region surrounding the Bering Strait, the Chukchi Sea, and the Bering Sea. The peculiarities of the geographical location of the Chuckchee Sea have determined an appearance of the bryozoan fauna with species of Arctic and Pacific origin and with few representatives of Atlantic origin. Diving collection of the expedition of ZIN RAS under leadership Golikov A.N. in the Chuckchee Sea in 1976 included twenty seven species and subspecies of Bryozoa with two Arctic species (one with circumpolar and one with the Eurasian distribution) between them and with all other species such as boreal arctic widespread species (two of them of the Pacific origin). Finding of new for the fauna of the Chuckchee Sea of amphiboreal species *Einhornia crustulenta baltica,* which inhabites the Baltic Sea, can compare with registered before in the Chuckchee Sea of amphiboreal species *Caulorhamphus spiniferum* and *Parasmittina* trispinosa. Kluge G.A. wrote that the species can consider as relicts. The deep water Providence Bay in the Bering Sea plays important role in an investigation of the Eastern Arctic. Ice conditions in the Providence Bay is more favorable in comparison with the ice conditions of the Chuckchee Sea,.The Providence Bay is entirely or partly free of ice from May until October. The water temperature is not higher than +2–+3°C degrees in this period. Data about Bryozoan fauna of the Providence Bay was almost absent. Diving collection of the same expedition of ZIN RAS under leadership Golikov A.N. in the Providence Bay in 1976 was represented by 32 species and subspecies of Bryozoa. The Bryozoan fauna of the Providence Bay in the biogeographical relationship had coldwater appearance. The fauna was represented by Arctic species (7% of total number of bryozoan species); boreal arctic species (59%) with one species of the Atlantic origin and with all other species of the Pacific origin and boreal arctic circumpolar widespread species as well; high boreal arctic species (10%). There were a group of boreal species of different origin: widespread boreal Pacific species (10%); amphiboreal (7%) and amphipacific (7%) species. Two species *Einhornia crustulenta baltica* (Borg) and *Flustrellaria whiteavesi* Norman were registered for the Bering Sea in the first time. The most important role at different depths in the Providence Bay had boreal arctic species of Bryozoa. They were mainly boreal arctic species of widespread and circumpolar distribution or of the Pacific origin. Arctic species were represented by two species with circumpolar distribution. Presence of one boreal arctic species of Atlantic origin and Arctic species testifies to a penetration of bryozoan fauna from the Chuckchee Sea to the Bering Sea. It should be stressed a presence of widespread boreal, amphiboreal and amphipacific bryozoan species in the Providence Bay, which testifies to an influence of the Pacific Boreal fauna. Especially it should be emphasized the finding of the species *Einhornia crustulenta baltica* in the Providence Bay, which can consider as relict as in the fauna of the Chuckchee Sea.

ASSESSMENT OF BEAVER'S (*CASTOR FIBER* L.) BUILDING ACTIVITY USING GIS AND REMOTE SENSING DATA

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The Eurasian Beaver (*Castor fiber* L.) is among those species that some consider as ecological engineers in ecosystems. That is why the beaver's activity has been closely studied. In Russia, studying beaver activity with rare exception is conducted using land descriptive methods, and in most cases at the level of individual beaver ponds. With the access to high spatial resolution satellite data, it becomes possible to study beaver's activity as an ecosystem engineer remotely as well as study of its impact on the ecosystem at the level of entire watersheds.

Prioksko Terrasny Nature Biosphere Reserve was chosen as a model area in this study, because it has a well known history of beaver populations on its territory.

Analysis of the potentials of medium resolution (Landsat 7) and very high resolution (IKONOS, GeoEye 1) satellite to map objects of beaver activity was performed. Primary data was obtained from the ground survey of Prioksko Terrasny Reserve stream valleys with satellite navigator (GPS) in years 2009–2012.

Analysis of LANDSAT imagery in order to identify objects of beaver activity in the reserve showed unsatisfactory results because the objects in their size appeared less than the satellite spatial resolution on the ground. In very high resolution images (IKONOS, GeoEye 1) we managed to successfully identify only beaver ponds, whereas dams identification proved to be practically impossible. The accuracy of the edge detection of the beaver ponds estimates of 85–95%. According to the results of the automatic identification of elements of life beaver activity quantitative assessment of beaver ponds and their areal parameters for years 2008 and 2010 was done. In 2008 the total area of the ponds was 5336 m^2. In 2010, the number of ponds increased to 10 with their total area of 4730 m^2. Thus, the climatic conditions in 2010 had a significant impact on the size of ponds.

In the high resolution images it was also possible to identify a embankment of a beaver dam. The length of the dam measured using GeoEye 1 image was about 40 m.

WALLEYE POLLOCK *THERAGRA CHALCOGRAMMA* – THE INVADER IN NORTH PACIFIC

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Walleye pollock *Theragra chalcogramma* (Pallas, [1814]), a fish of the family Gagidae, is the most common and abundant commercial species in the North Pacific Ocean. This species has become the most significant commercial fish of world fisheries since the mid eighties of the last century. In the nineties, the annual catch of walleye pollock by all countries exceeded 6.5 million tons. Walleye pollock is widespread in almost the entire North Pacific, from the Bering Strait in the north to Korea and Japan along the Asian coast, and to California along the American coast, and in oceanic waters.

It is believed that the center of the formation of family Gagidae in the northern hemisphere is the northern part of the Atlantic Ocean. For a long time, the only exception to this general rule was the genus *Theragra*. It was assumed that that the walleye pollock was purely Pacific species. However, close species, the Atlantic walleye pollock (*Theragra finmarchica*) was recently found in the North Atlantic. Thus, it was confirmed that the Pacific walleye pollock comes from the Atlantic.

Probably, the penetration of fishes of the family Gagidae in the North Pacific was at the opening of the Bering Strait. New data show that the first opening of the Bering Strait occurred in the late Miocene (5.5 million years ago). Walleye pollock, a rare species in the North Atlantic, has penetrated into the North Pacific. In the evolution the species became widely spread there, and took a dominant position. Thus, it occupied the same ecological niche that the cod (*Gadus morhua*) in the North Atlantic.

It is known that the fish early development determine their abundance and stocks. Genera of the cod (*Gadus*) and the walleye pollock (*Theragra*) differ in early ontogeny and in requirements for environmental conditions. Thus, the life cycle of Atlantic cod is tied to warm current systems in the North Atlantic and adjacent areas of the Arctic Ocean. Spawning occurs over up to 100 m of bottom depths at a temperature near 5ºC, on the border of the warm waters of Atlantic origin and local colder waters. Spawned pelagic eggs drifted in currents. The eggs and newly hatched larvae drift under the branches of warm currents up to 200 km.

Pacific cod, in contrast to the Atlantic cod, spawn at a bottom, is more sedentary species, limited seasonal migrations only (from the coast in winter and to the shores in summer). These features of the early development of Pacific cod were developing in the evolution as adaptation to a harsh environment in the North Pacific. In contrast to the North Atlantic, subarctic masses of cold water occupied all the space of north western Pacific. Prevailing currents formed in the Bering Sea, and promotes to a cooling of cyclonic circulation.

The Atlantic walleye pollock, a rare species, caught over deep slope in the Norwegian Sea. The genus *Theragra*, unlike the *Gadus*, spawn in more deep waters at bottom (100 to 500 m). Hatched eggs of Pacific walleye pollock develop at lower water temperature (about 0ºC, even negative) at surface. Developing eggs drift in cold currents. Suitability of walleye pollock to the harsh conditions caused to its survival and wide distribution in the North Pacific during evolution.

SHELL FORM AND GROWTH OF A NEW ALIEN SPECIES OF *RANGIA CUNEATA* (G.B. SOWERBY I, 1831) IN THE VISTULA LAGOON (BALTIC SEA)

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North American brackish water clam ***Rangia cuneata*** (G.B. Sowerby I, 1831) was recorded for the first time in the Vistula Lagoon of the Baltic Sea in September 18th, 2010.

The material was collected in the coordinates 54°40.2' N and 20°00.9' E at the depth of 3.6 m from September 2011 to November 2012. This sampling point was chosen because here the most dense settlement of ***Rangia cuneata***. A total of 11 selections are made with four replicate samples. Clams preserved 70° ethanol. The length, width and height of the molluscs shell measured by electronic caliper «PREISSER DIGI MET®» up to 0.01 mm. Wet and dry weight of wedge clams determined up to 0.001 g. Atlantic rangia were dried at a temperature of 60ºC for 24 hours. The equations direct and simple allometry approximated connections between shell length and width, height, weight for each of the 11 selections. Age of individuals was determined by the annual rings on the shell.

At the station, the two massive occurrences of juvenile wedge clams were observed in September October 2010 (group I) and May–July 2011 (group II). Shell lengths ranged from 4.90 to 28.09 mm for groups I and II. In April 2012, one wedge clam was found with a shell length 43.40 mm and age 4 years.

Shell length of live Atlantic rangia group I increased from an average of 19.58 in September 2011 to 23.31 mm in November 2012, and the group II – from 13.28 mm to 20.34 mm. The largest increase in shell length was observed from June to September. The death of wedge clams was marked in April 2012, which it was observed until the beginning of summer. The average percentage of dead wedge clam amounted to 51.08% of the total number of ***Rangia cuneata*** (the sum of the living and the dead individuals) in May–June 2012.

Shell height relative length changes according to the principle of positive allometry from September 2011 to January 2012 (i.e. the coefficient b is greater than 1), and with April 2012 – to the principle of negative allometry ($b < 1$).

Shell width to length varied according to the principle of negative allometry in the warm season (with May to September), and to the principle of negative allometry in the cold season (with October to April).

Wet weight with water and/or in the mantle cavity (LWW) changes the relative shell length mostly to the principle of positive allometry ($b > 3$), and in April, June and August 2012 – to the principle of negative allometry ($b < 3$). The total wet weight without water and/or in the mantle cavity (TWW), wet weight of the shell (SWW), total dry weight (TDW) and dry weight of the shell (SDW) changes the relative shell length to the principle of positive allometry, and only in June 2012 according to the principle of negative allometry.

Wet weight of the soft tissues (SFWW) to the shell length varies mainly to the principle of positive allometry, in January April 2012 – to the principle of negative allometry. Dry weight of soft tissues (SFDW) to the shell length varied according to the principle of negative allometry from September 2011 to September 2012, and in October November 2012 – to the principle of positive allometry.

ALIEN ANIMAL SPECIES IN THE PENZA REGION

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Penza Region is located in the forest steppe zone on the Right Bank of the Volga within the N52.31º … N54.03º latitude and E42.04º … E46.57º longitude. This report presents data on some alien species of animals that have been accidentally or specially brought on the territory of the Penza region or self settled within it.

Among the unintentionally introduced species were four species of terrestrial mollusks, five species of insects and two species of fish. The native range of mollusks (*Oxychilus draparnaudi*, *Helix lucorum*, *Cepaea vindobonensis*, *Limax flavus*, *Limax maximus*) is located in Western Europe and Southern Europe or in Asia Minor. Four species of the introduced insects (House centipede *Scutigera coleoptrata*, Greenhouse camel cricket *Diestrammena asynamorus*, Bean weevil *Acanthoscelides obtectus*, Fall webworm *Hyphantria cunea*) were southern species and one was from the Eastern Palaearctic (Tortrix moths *Olethreutes aviana*). The introduced fish species were Black striped pipefish *Syngnathus abaster*, Chinese sleeper *Perccottus glenii*.

Because of the natural range expansion, two species of common bats (Kuhl’s pipistrelle *Pipistrellus kuhli* and Common serotine *Eptesicus serotinus*) which are adapted to anthropogenic landscapes settled in the region. The appearance of the territory Ukrainian brook lamprey *Eudontomyzon mariae*, Azov shemaya *Alburnus leobergi*, Black Sea roach *Rutilus frisii*, Zarte *Vimba vimba* and Don ruffe *Gimnocephalus acerinus* also can be assigned to the natural range extension or perhaps to the recovery of their native range.

Intentional introduction for stocking was finished in 1980–1990 and was mainly concerned with the game mammals Common muskrats *Ondatra zibethicus* (the number of individuals 242, origin area Nyzhny Novgorod region, Archangelsk zoo centers), Raccoon dog *Nyctereutes procyonoides* (80, Primorye), American mink *Neovison vison* (42, Bashkiria), Sika deer *Cervus nippon* (111, Hopersky Reserve), except for Russet ground squirrel *Spermophilus major* (30, Saratov region) which was introduced for scientific purposes. Besides, with reintroduction purposes, some animal species were brought from remote parts of their range: Mountain hare *Lepus timidus* (208, Tuva, Novosibirsk and Irkutsk regions), Bobak marmot *Marmota bobak* (655, Saratov region), Eurasian beaver *Castor fiber* (123, Ryazan, Bryansk and Voronezh region), Sibirean roe deer *Capreolus pygargus* (22, Primorye).

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NON NATIVE FRESHWATER FISH SPECIES IN THE OB RIVER BASIN

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At present, 21 non native fish species are known in the Ob basin. The introductions were unsuccessful for 3: the *Mylopharyngodon piceus*, the *Ictiobus niger* and the *Oncorhynchus keta* do not occur now in Western Siberia. Two species (the *Salmo trutta* and the *Oncorhynchus mykiss*) are found near farms, where they are bred, as well as in reservoirs, where they are regularly released, but to date, there is no reliable information on the natural reproduction of these species in the Ob basin.

Seven species formed local self sustaining populations, but have not started to spread. The *Coregonus albula* and the *Osmerus eperlanus* live in the lakes of the Urals and Khakassia (upper reaches of the Chulym river), where they were introduced. The *Ictalurus punctatus*, the *Hypophthalmichthys molitrix* and the *Aristichthys nobilis*, the *Ctenopharyngodon idella* and the *Ictiobus cyprinellus* inhabit the Belovo reservoir. The relatively high water temperatures ensured the reproduction of thermophilic species.

Nine species (almost 43% of all alien species known for the Ob basin) formed self sustaining populations in natural waters and began dispersal. This species did so at different rates. The most rapidly spreading species were the *Perccottus glenii*, the *Sander lucioperca* and the *Abramis brama* (after the introduction of the latter in the Novosibirsk reservoir). All three species in less than ten years have become known to a distance of 1000 km from the place of introduction (for the chinese sleeper – the place of the first detection). The *Cyprinus carpio* spread much more slowly, over 10 years after the start of introduction at the Novosibirsk reservoir it had not been not met in the Ob outside of this reservoir. Spreading of the *Leucaspius delineatus* was even slower: it first appeared in early 60's in one of the tributaries of the Ob River, 200 km downstream of the Novosibirsk Hydroelectric Station, however, it became known only 30 years later in the reservoir. The *Misgurnus nikolskyi* had the lowest rate of spread, to date it occurs no more than 100 km from the Novosibirsk reservoir. The rate of colonization of the *Pseudorasbora parva*, the *Alburnus alburnus* and the *Pungitius platygaster* is difficult to assess because it is not known when they first occurred in the basin of the Ob River.

Most naturalized alien species in the Ob basin originate from two donor regions: the southern Far East and European Russia. The basic vector invasion is intentional introduction.

The proportion of alien species in the structure of fish fauna of different regions Ob basin varies widely – from 0 in the Seaside Ob to 29% in the Upper and the Middle Irtysh. There is a tendency to reduce the number of alien species to the north and south basin, a decrease of average monthly water temperature at the time when the fish spawn.

ACCLIMATIZATION AND DISPERSE OF BREAM IN THE YENISEI RIVER BASIN

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Bream East (Abramis brama orientalis) inspires artificially in most reservoirs in Western and Eastern Siberia, including in the Yenisei basin reservoirs – Krasnoyarsk, Bratsk. In 1964 and 1966 ys., at river Yenisei (in the zone of the reservoir) were produced 26.2 thousand different age fish. Stocking of bream taken regularly over the next few years. The total number of invasive bream for the period 1964–1970 ys. was only 37.5 thousand copies (Olshanskaya, 1977). Bream from the reservoir up to the Upper Yenisei, mastered the waters of the Sayano Shushenskaya future reservoir and continues to settle up the Large and Small Yenisei. Some individuals climb up the tributaries of hundreds of kilometers and even penetrate deep oligotrophic lake (Popkov et al., 2010). Bream slid across the dam of the Krasnoyarsk hydroelectric power station in the downstream and was widespread in the Middle Yenisei River up to the Stony Tunguska River. Sporadically found to Dudinka. Known in the tributaries of the Yenisei (Kahn, Shim, Angara). Directly in the river. Yenisei River (to the mouth. P. Tunguska River) in the early 1990 ys., this species was of catching random. Bream began dating to 2003–2006 ys. practically the whole of the Yenisey River up the town of Yeniseisk to Vorogovskie island.

Thus, over 45 years, from the first stocking, bream occupied the significant pool waters of Upper, Middle and Lower Yenisei and continued to settle in the north, and south, and, in addition, develop lateral inflows.

The bream met in the 70 years of the twentieth century in Angara river, rays of the Bratsk reservoir. Invader has successfully mastered the Ust Ilim reservoir. The bream in a short time become one of the main species in commercial catches in 1970–1980's, due to the favorable conditions in the reservoirs of the Yenisei River.

Bream was brought in the Chagytai Lake (basin of the Upper Yenisei, Tuva Republic) in 1965 from the Uba Lake, successfully acclimated and naturally produced. Bream is second after peled largest commercial catches in Chagytai Lake. Commercial fishing was banned for three years in Chagytai Lake by Government of Republic Tyva from 25.06.2007. The size of the universe of bream in the lake has increased dramatically as a result of the termination of the fishery which led to increased competition for food bream peled and reduce the biomass of zoobenthos.

Bream goes to food zooplankton (massive food item in the reservoirs) with a deficit of zoobenthos in reservoirs of the Yenisei, it becomes sexually mature at small sizes. Bream is a classical benthophages at Yenisei River Its mass distribution and increase in number in recent years accounted for part of the river from the mouth of the Angara to Vorogovsk Islands – spawning sturgeon, whitefish and semi anadromous whitefish – inconnu, omul, vendace.

Bream is an invasive species in the present and provide tough competition valuable species of aboriginal ichthyofauna, because of its evribiontnost and high fertility.

DISTRIBUTION OF STONE MOROKO *PSEUDORASBORA PARVA* IN THE UPPER DON BASIN

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The ivasive range of stone moroko (*Pseudorasbora parva*) occupies extensive territories of Central Asia, the Caucasian region, almost in all countries of Europe, and also in Iran, Algeria and Turkey.

In the upper Don basin the species was found out for the first time in September, 1997 in "Galichja gora" reserve (Zadonsky area of the Lipetsk region) (the copy is stored in vertebrate laboratory of reserve).

Then in 2003–2006 stone moroko has been met as in Don, and its right bank tributaries. By results of catching by minnow dragnet its share (persentage) in the population of fishes is insignificant. The stone moroko is usual only in the Sosna river (2.1%), it is not numerous – in the rivers Don (0.1%), Palna (0.3%) and Olym (0.9%), and it is rare (less than 0.1%) – in the rivers Kshen and Vorgol.

At catching in 2010–2012 the same tools the situation neither with distribution, nor from shares in the population practically has not changed. The facts of stone moroko absence in the rivers – Don tributaries of the first order, such as Skvirnja, Again and the Dry Lubna, located within a modern area of a species and quite accessible to its moving are worthy. Still the species is usual only in the Sosna river the (1.6%), and in the others it is not numerous (Don, Palna, Kshen, Olym) or it is rare (Vorgol, Svishnja). Absolute fecundity is lowest and fluctuates from 130 to 400 roe corns, on the average – 250. Therefore, at least, for the Top Don active expansion of invasive species does not occur. Most likely, environmental conditions, and first of all temperature, limit occurrence of the productive generations necessary for the further moving.

It is supposed stone moroko moving in Top Don basin goes from the Sosna river since it is found out only in this river, its tributaries and in Don at the confluence of Sosna and Don and more low on a current. The stone moroko, and also other species of the Chinese faunistic complex (Amur sleeper *Perccottus glenii*, silver carp *Hypophthalmichthys molitrix*) get here from adjacent fish farm.

It is necessary to notice that the rivers in which now stone moroko was naturalized – the right tributaries of Don, are located on Central Russian upland and have high speeds of a current. Thus the highest correlation communications at stone moroko concerning to limnophilous complex, are observed with species – rheophils. So, an Spirmen indicator of correlation (at $p \leq 0.05$) – with the asp *Aspius aspius* – 0.41, with the monkey goby *Neogobius fluviatilis* – 0.40, with the shemaya *Chalcalburnus chalcoides* – 0.36 and with the vimba *Vimba vimba* – 0.32. Possibly, this is connected with ecological plasticity of stone moroko that is noted by many researchers.

Thus, the border of invasive range of stone moroko possibly passes on Top Don basin within the Lipetsk region and last 5–10 years remains without changes.

MONITORING OF ALIEN SPECIES IN MARINE AND INSULAR PROTECTED AREAS BY THE EXAMPLE OF THE FAR EAST MARINE BIOSPHERE RESERVE OF THE FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES

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Alien species pose a continuously growing problem around the world. Marine protected areas (MPA) are believed to shield marine ecosystems from the human interference. Nevertheless, no physical barriers in the marine environment can prevent alien species from intrusion. Russian MPAs do not have an effective system to bar inflow of new and monitor already existing alien species in their territories and waters. Currently, the necessity of development of a program for the control over alien species in MPA has become especially urgent.

The Far East Marine Biosphere Reserve, Far Eastern Branch of the Russian Academy of Sciences, is chosen as a model object for the study. Among 13 Russian biosphere reserves with marine waters, the biological diversity of marine and insular biota in this one has been studied most thoroughly. As a result of long term investigations, more than 5100 species of terrestrial and marine species have been registered here. The issue of presence of alien species and probable ways of their inflow in a MPA is analyzed by the example of the Marine Biosphere Reserve.

The conducted studies have shown that the reserve, being a standard of natural ecosystems in Peter the Great Bay, Sea of Japan, nevertheless is exposed to invasion of alien species. A total of 499 new taxa have been found in the Marine Biosphere Reserve and adjacent territories and waters; 131 of them identified to species. The largest number of newly recorded species is observed among planktonic microalgae (63) and diatom algae of periphyton (53). Much fewer alien species have been registered both in the biofouling of hydrotechnical structures and in the benthos (7). Insects are represented by 5 species; the ichthyofauna and meroplankton number 2 and 1 species, respectively.

In order to establish the probability of invader status (ISP), the scale of presence/absence of species' character is developed. By using this method, a total of 194 alien species have been revealed within the reserve and in adjacent waters. Almost a half of the studied invasive species here have the lowest ISP, 30%; those 80 species with the ISP value of 100% can be regarded as naturalized ones. The major portion of naturalized species, 72, is vascular plants.

One of the main ways for invasive species to get into the reserve is anthropogenic impact that promotes transfer of marine organisms both by seagoing vessels and as a result of economic development of islands. Another portion of alien organisms comes in the area of the reserve with currents of subtropical waters, bringing large amounts of marine litter, which is used by a number of organisms, including alien ones, as a substrate to settle. The continuous effect of subtropical waters results in the inflow of migrants from the south, as well as the arrival of larvae of alien species. In view of the global climatic changes and thermal pollution, creation of favorable conditions for their invasion here is highly probable. The immigration of alien insect species in the reserve is also promoted by the prevailing trend of cyclonic activity from the southwest to the northeast, almost along the general orientation of the western shoreline of Peter the Great Bay.

THE SPATIOTEMPORAL DYNAMICS OF DISTRIBUTION OF POPULATION OF INVADER *MNEMIOPSIS LEIDYI* IN THE CASPIAN SEA

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Monitoring studies of the pelagic ecosystem of the Caspian Sea, conducted by the Caspian Fisheries Research Institute ("CaspNIRKh") helped to detect the invader *Mnemiopsis leidyi* and to trace the process of the formation of a new population from "naturalization stage" to "stabilization stage". Relying on the biological characteristics of *Mnemiopsis leidyi* (hermaphrodite with high fertility and pedogenesis, zooplanktofag with low food selectivity), and favorable environmental conditions (hydrological and hydro chemical regime, the absence of vermin and parasites), new viable population was created in the Caspian sea for 3–4 years.

In such an isolated pond as the Caspian Sea, the emergence of representatives of types Ctenophora (CTENOPHORES) and coelenterates (COELENTERATA) are considered by ecologists as the formation of dead end in food chains, removed a large part of matter and energy from marine ecosystems. Besides the emergence of a new type of short cycle form with an aggressive r strategy poses a threat to native species as a result of their direct predation and competition for food.

The study of the biological characteristics of the form in new ecological conditions of the Caspian Sea, its pathways allows to predict the dynamics of the development of the population of *Mnemiopsis leidyi,* respectively the extent of its impact as on the ecosystem in general and on individual levels, primarily major food competitors of Mnemiopsis – fish zooplanktofags. Accordingly, long term (1999–2012) data are ecological and biological reasonable for elaboration of the strategy and tactics of suppression number of Mnemiopsis leidyi population and reduce its impact.

Analysis of the size and age composition in different districts of the sea showed that its presence in the Northern Caspian during the growing period is temporal. That is, the development of the Northern Caspian Mnemiopsis population depends on the terms of its penetration here in the summer from more southern parts of the sea. By the end of autumn under intensive cooling of the Northern Caspian they are completely extinct. A similar pattern annual spring penetration is observed in the Black Sea (hibernation) with the autumn withering away in the Azov Sea.

The development of sub populations of Mnemiopsis in the Middle Caspian has semi depended character, as in the deep water area it hibernates and evolving, but during the abnormally cold winters Mnemiopsis completely dies out and is re colonized in the spring from the South Caspian.

The South Caspian is the main site of formation of the nucleus of all Mnemiopsis leidyi population throughout the year. In the spring after wintering, with the heating of the upper production layer of the sea (0–50 m) and the development of prey (zooplankton), avalanche increase abundance and biomass of the population is observed, that eventually leads to the expansion of boundaries of its area almost on the whole area of the Caspian Sea.

In summer in the Middle and South Caspian since the completion of the thermocline the main part of comb clusters is concentrated in the layer above the thermocline (0–25 m), over 90–100% of the population, or 77–100% of the biomass. At lower levels (25–50 m), it is much rarer, and at depth over 50 m was completely missing. Thus, in the summer the thermocline is a deterrent to entry Mnemiopsis leidyi in greater depth. With the onset a homothermy in cold time, the comb penetrates into the deeper layers of the sea, so in October November it encounteres at a depth of 50 m, and in the winter and early spring – to 100 m.

BASIC ELEMENTS OF SIMULATION MODEL OF HYDROLOGICAL REGIME OF THE NORTHERN CASPIAN IN PREDICTING INVASION MNEMIOPSIS LEIDYI

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Northern Caspian is one of the most productive areas of the Caspian sea, here are the feeding habitats of species of marine, anadromous and catadromous fish. Invasion and massive development of ctenophores *Mnemiopsis leidyi* has led to the restructuring of all levels of the ecosystem of the North Caspian Sea, which led to a decrease in food reserve of fish that feed on zooplankton as: anchovy sprat (*Clupeonella engrauliformes*) and big eyed kilka (*Clupeonella grimmi*), some non predatory species herewith. herring (*Allosa*), and benthic feeding fish: Caspian roach (*Rutilus rutilus caspicus*), bream (*Abramis brama*), representatives of the family. Sturgeon (*Acipenseridae*), etc. Currently, there is an urgent need for models of environmental factors of aquatic organisms for scientific forecasting for creation and selection of scenarios of anthropogenic impacts on the marine ecosystems of the North Caspian Sea.

Based on the geomorphological features of the North Caspian Sea, in the seasonal and interannual dynamics of the model abiotic conditions invasion invader *Mnemiopsis leidyi* we have identified the main synoptic, hydrological and hydro chemical elements are:
1 – wind patterns over the North Caspian Sea;
2 – ice conditions in the Northern Caspian Sea;
3 – the flow regime of the Volga and the Urals;
4 – mode of atmospheric precipitation in the Northern Caspian;
5 – Mode of evaporation from the surface of the North Caspian Sea;
6 – temperature control waters of the Caspian Sea;
7 – internal fluid dynamics (water exchange between the regions of the North Caspian Sea);
8 – External hydrodynamics (water exchange between the North and Middle Caspian);
9 – mode salinity waters of the Caspian Sea.

For simplicification, the following assumptions: – river flows in the North Caspian Sea is completely predetermined by the rivers Volga and the Urals – the distribution of the annual river flow by month corresponds to a multiyear average – during the year, the amount of precipitation falling on the coast, more than that of the sea – there is a tendency an increase in precipitation in the direction of the south, south east to the north and north west – the least amount of rainfall in the eastern and south eastern region of the North Caspian Sea.

For a small amount (0.5%) and a significant surface area (24.3%), the temperature regime of the North Caspian is not stable. Annual dynamics of the temperature of its regions approximated with a high correlation coefficient (0.97–0.99). Step model defines the characteristics of the dynamics of water masses: the volume of flow of the Volga and the Urals, the volume of the North Caspian Sea in general and the exchange of water between the i areas, between the middle and northern Caspian Sea, between the North and the Caspian Sea and the shallow bays. Salt and water exchange between the i sea areas is the resultant of the water balance, having a known salinity and volume, it is calculated on the salinity of each i sector of the North Caspian Sea.

Hydrological model, taking into account seasonal and interannual features necessary for the development of a simulation model and the annual penetration and development in the North Caspian invader *Mnemiopsis leidyi*. Thus above listed items are the constituent elements of a single block of the North Caspian ecosystem, respectively, the results are the initial data for the other sub models: salinity, phytoplankton and zooplankton, aquatic populations (*Mnemiopsis leidyi*), etc.

THE IMPACT OF INVADER MNEMIOPSIS LEIDYI ON ABORIGINAL FAUNA OF THE CASPIAN SEA

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During the naturalization invader Mnemiopsis leidyi, in 2000, the South Caspian zooplankton was presented by 22 species, in 2002 it consisted just of 9 species. In addition, the number of zooplankton from 1999 to 2002 depending the districts dropped 4–10 times. Now the basis of quantity (91%) and biomass (98%) of zooplankton is only defined by one species – *Acartia* sp. After 1999, endemics of the Caspian Sea, formerly abundant species *Eurytemora grimmi* and *E. minor*, formerly constituted the basis of the diet of pelagic fish, disappeared from the composition of the zooplankton of the Middle and South Caspian. As part of meroplankton (larvae of benthic animals in the planktonic stage) the number of larvae of mollusks decreased.

Since 2000, there has been a steady reduction of the biomass of benthic organisms with planktonic larval stage (bivalves (cl. Bivalvia)), Polychaeta worms (cl. Polychaeta)). So according to A.A. Polyaninova (2003), at the eastern coasts of the South Caspian, the clam *Mytilaster lineatus* which met earlier in the composition of zoobenthos in significant amounts (up to 52 g/m^2) has ceased to meet in samples.

During abnormally warm years the growing season of the population Mnemiopsis leidyi increases, which leads to its earlier penetration to the North Caspian (from 1–2 to 5 weeks). Given the shallowness of the North Caspian Sea and the selectivity in the diet of Mnemiopsis (it prefers meroplankton), such trophic press reflected in a large extent on the basis of benthic feeding fish: roach (*Rutilus rutilus caspicus*), bream (*Abramis brama*), common carp (*Cyprinus carpio*) and sturgeon (Acipenseridae).

The negative impact of Ctenophora Mnemiopsis has affected primarily on fish plankton eaters, especially on the most massive kind – anchovy sprat (*Clupeonella engrauliformes*). In the years that an increase in the number of invader comb (*Mnemiopsis leidyi*) had been seen, the decline of research catches of anchovy sprat yearlings (*Clupeonella engrauliformes*) is traced. In the last decade, its catches (*Clupeonella engrauliformes*) were less than about 10–11 times, compared to average performance period to the invasion of Mnemiopsis.

Equally significant irreversible changes of trophic relations of ecosystems should be reflected on the Caspian seal (*Phoca caspica*) – as the "top" of the food pyramid of the Caspian Sea. For example, L.S. Khuraskin and others have noted that in September 2001 and 2002 because of the poor fed of seal was marked delay post feeding migration to the North Caspian, and also the deterioration of the morphofunctional state of animals in post feeding period.

After the massive death of Caspian sprat in 2001 their numbers so far still can not recover to present time, because and currently *Mnemiopsis leidyi* is one of the main factors hindering rehabilitation population of anchovy sprat (*Clupeonella engrauliformes*). To this problem of "invasive species" should be approached comprehensively and thoroughly, it's positive solution can only be a with joint efforts of experts of all the littoral states. Only then it will restore the biological resources of the Caspian Sea.

THE PROBLEM OF EXTERNAL AND INTERNAL ALLIENS SPECIES IN KAZAKHSTAN

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Adventives alien are considered second habitat destruction threat of biodiversity and the economy. Any adventive organism is relating to the goods or products, eventually taking root in the country of importation. After acclimatization in the new location they will have a negative impact on the ecological community. In Kazakhstan this problem is acute. For example, *Ambrosia artemisifolia* from 2005 to 2011 year settled in Kazakhstan from 3959.7 to 6137.2 ha and *Acroptilon repens* occupied area of 2.6 million ha compared to 650 thousand hectares in 1970. In recent years new species of insect have discovered. In recent years, in the south east of the country (in National park «Ile Alatau» near Almaty city) first time identified a number of serious pests. Among them ***Platysoma angustatum*** – primary area: Europe, Siberia, Near East. ***Ostoma ferrugineum*** – primary area: Europe, Siberia, the Near East, Japan, Nepal, North America. ***Dryocoetes autographus*** – primary area: North Africa, Europe, the Caucasus, Transcaucasia, Siberia, the Near East, Mongolia, Korea, China (including Taiwan), Japan, North America. ***Ips sexdentatus*** in the growing pines – primary area: Europe, Asia Minor, the Caucasus, Siberia, the Near East, Mongolia, China, Korea, Thailand, Myanmar, North America (introduced). ***Rhagium inquisitor*** technical pest vector fungal infections, larvae develop in various fresh dead wood of coniferous trees (spruce, pine, larch), sometimes, on a birch tree. General Distribution: North Africa, Europe, the Caucasus, Siberia, the Near East, the Middle East, Iran, Afghanistan, Mongolia, North China, Korea, Japan, North America. ***Xylotrechus rusticus*** – technical and physiological pest. The primary area of North Africa, Europe, the Middle East, the Caucasus, Transcaucasia, Central Asia, Iran, Afghanistan, Mongolia, North China, Korea and Japan. ***Saperda perforata*** discovered on Mount Mokhnatko in National park «Ile Alatau». Species, previously known only from the northern Kazakhstan and Dzungarian and Zailiyskiy Alatau. Sometimes damage aspen, poplar.

Also last time new pests of storage products were identify: ***Cryptolestes capensi, Attagenus smirnovi*** are polyphagous pest were registered in Almaty for the first time in Kazakhstan.

Sitophilus zeamais **(*Calandra zeamais*)** was found in the north and south east (Almaty). Polyphagous pest. The primary area of this pest are Western Europe, Scandinavia, Ukraine, European Russia, the Caucasus, West and Central Asia, India, Africa, North, Central and South America, Australia, New Zealand. The exact distribution of the CIS has not yet fully elucidated.

In Almaty region in the village Boraldai were found ***Agrilus derasofasciatus*** on the grapes in large numbers. For Republic it is specified for the first time.

INVASIVE SPECIES OF AQUATIC MACROPHYTES OF THE VYATKA KAMA CIS URALS

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Under invasive species we perceive the alien species possessing potential ability to introduction in natural and seminatural ecosystems, to successful fastening in them and to the further diffusion to various ecosystems. Process of an invasion, as a rule, is preceded by infringement of structural integrity and functional originality of natural ecosystems owing to direct or indirect practical work of the people. It leads to building of the transformed and artificial ecotopes. Alien species introduction in them promotes their diffusion to region on anthropogenic localities and further can be accompanied by invasion in natural ecosystems, especially those from them which are subject to periodic influences of natural breaking factors (coastal abrasions and landslips, places of drinking, grooves and tracks of animals).

In the territory of the Vyatka Kama Cis Urals (VKCU), covering terrain of the Udmurt Republic and adjacent areas of the Perm and the Kirov regions, Republics of Tatarstan and Bashkortostan, 26 species of alien macrophytes are recorded. 13 of them are the invasive species.

Elodea canadensis in the VKCU has strongly taken positions of the polytopic mezo eutrofic ecologically plastic competitive species and now it grows in the various natural and artificial, pure and polluted reservoirs and waterways.

Epilobium adenocaulon and *E. tetragonum* are now usual enough components of natural and broken semiaquatic communities of the VKCU also, though they do not form their own associations, unlike *Salix* × *rubens*, growing out hybridization of indigenous *Salix alba* with invasive *S. fragilis* implanted in the inundated ecosystems of the region.

Impatiens glandulifera, Mentha longifolia, Phragmites altissimus, Juncus tenuis, Echinochloa crusgalli and *Lemna gibba* were successfully naturalized in the secondary localities and actively develop natural biotops. First two of them, as well as *S. fragilis*, are cultivated species. *P. altissimus* and *L. gibba* are the macrothermal species with intensively extending stations. The diffusion of these species to the region is bound to the broken and artificial aquatic ecosystems.

Typha laxmannii invades the roadside localities, it is implanted in a natural communities in the south of the region, presented by nonturfed meadow on the river alluvion.

Najas major growing in the Bui River and on shoal of Karmanovsky and Nizhnekamsk reservoirs where it forms one or few species communities in which it is a dominant. The water preheating by warm exhaust waters of the Karmanovsky Power Plant is favoured the satisfactory state of populations of this macrothermal species in region. Now the introduction of *Najas* in a natural fresh water communities of the floodplain of the Kama River is observed.

In warmwater waste canals of the Karmanovsky Power Plant there is one more thermophilous species, *Vallisneria spiralis*, recorded. In warm waters *Vallisneria* was naturalized, however it occurs only in waters where the temperature is higher than values natural for the subtaiga natural zone.

From the listed invasive macrophytes only 4 species are genuine aquatic plants, others belong to semiaquatic species. In the future it is necessary to expect appearance in aquatic ecosystems of VKCU of variety invasive species which have already mastered terrains of many more western and southern regions of the country that will be promoted by climatic rearrangements and proceeding anthropogenic transformation of ecosystems of reservoirs and waterways.

THERMAL PREFERENCE AND THERMAL RESISTENCE OF THE AMUR SLEEPER DURING AUTUMN AND WINTER SEASONS

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The *Perccottus glenii* is one of the most successfully spreading species in fresh waterbodies of Russia and Europe. It usually dominates in small reservoirs but its abundance is limited and controlled by predators in larger reservoirs. Ecological and physiological mechanisms of Amur sleeper adaptation to new environmental conditions, especially to temperature, have been studied fragmentary.

The preferred temperature (PT) and the final preferred temperature (FPT) were determined by the method of thermal preferendum in the horizontal thermogradient installation. The duration of the experiment was 12 days. The upper lethal temperature (ULT) was determined by the method of the critical thermal maximum when the water temperature in a test tank was raised at the rate of 4, 9, 14, 28 and 42ºC/h to the loss of balance by fish (CTM) and subsequent mortality of individuals (LT), and by the method of the lethal chronic maximum when the water temperature increased at the rate of 0.04ºC/h (1ºC/day) to the death of individuals (CLM) (Golovanov et al., 2013). The temperature of acclimation was 11ºC in autumn and 3ºC in winter.

In autumn fingerlings of the Amur sleeper placed in temperature gradient conditions concentrated in compartments with a temperature of 22–23ºC in 7–8 hours in each of the two experiments. Selection of FPT by fingerlings from the initial acclimation temperature 11ºC occurred rather fast. Thus, in the first experiment, the level of FPT 27.3±0.1ºC was reached on the third day and in the second experiment FPT (28.0±0.2ºC) was reached on the fourth day. By the end of the experiment the value of PT declined slightly, but remained ~27ºC, and the total range of the preferred temperatures was 26.4–28.3ºC beginning from 3–4 days,. The mean value of the FPT during the both experiments was 27.3±0.1ºC. In winter fingerlings of the Amur sleeper also demonstrated a quick gravitation from the initial acclimation temperature (3ºC) toward the final thermal preference during the first 7–8 hours in each of the two experiments. In two series of the experiment individuals concentrated in the region of FPT 27.7±0.1ºC and 26.3±0.1ºC on the third day and remained there without significant fluctuations in PT till the end of observations. The mean value of the FPT for two experiments was 27.0±0.2ºC.

The upper lethal temperature (CLM) of juvenile fish at the slowest heating rate of 0.04ºC/h, was in autumn (35.8±0.2ºC) and in winter (36.1±0.1ºC) periods. Values of CTM at the heating rate of 4, 9, 14, 28, 42ºC/h in were 31.9±0.2, 31.2±0.1, 31.6±0.1, 31.8±0.1 and 33.6±0.2ºC in autumn and 29.2±0.2, 28.9±0.1, 28.9±0.1, 27.7±0.1, 28.5±0.2 in winter, respectively ($p < 0.05$).

Thus, the thermopreference of fingerlings of the Amur sleeper in autumn and winter seasons was similar. During the first day of the experiment the individuals gravitated to the region of high temperatures rather quickly, they reached the FPT region during 3–4 days, and during the following days of the experiment significant fluctuations in PT were not observed. On the contrary, the thermal resistance of young Amur sleeper depended on the season of the year and on the rate of water heating. CTM of fingerlings was 2.3–5.1ºC higher in autumn than in winter at all rates of water heating. Values of LT were 1.5–2ºC higher than values of CTM at all rates of water heating. CLM values were similar during the both seasons.

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RELATIONSHIP OF THREE MASS INVASIVE SPECIES IN THE CASPIAN

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In the twentieth century in a stable ecosystem of the Caspian happened strong changes caused by new species invasions. Although the number of invasive species is relatively small, its occupied dominant position in the communities, surpassing other species in number and in biomass and changed the structure of communities and ecosystem. In Caspian invasive species dominate in phytoplankton, zooplankton, benthos, fouling and only in fish community its part is small. Under invasion of species that become dominant, restructuring of the whole community happened, including changes of other invasive species in number. Let's consider changes that happened under invasion of species belong to three different ecological groups: benthos, phytoplankton and zooplankton.

In 1918 the bivalve *Mytilaster lineatus* was delivered from Black Sea to the Caspian. Appearing in the Baku bay, for the first 15 years species colonized all Caspian and its biomass was about 11% of total, but in 1934–1938 sharp increase of biomass in 5–6 times, up to 42% of total occurred. *Mitilyaster* ousted two species of autochthon *Dreissena*, and formed a stable spacious biocenosis. However, in 2002 there was a sharp decrease of *Mitilyaster* in number and biomass, so *Dreissena* surpassed *Mitilyaster* in number and biomass and this condition persists to this day.

In 1934, in the South Caspian in large quantities has been found not to meet until diatom *Pseudosolenia (Rhizosolenia) calcar avis*. Probably species entered into the Caspian from the Black Sea with acclimatized mullets, and began colonization. Within one year *P. calcar avis* spread all over the Caspian and penetrated into the Northern part. In the Middle and Southern Caspian its biomass accounted for 75–95%, and in the central part of the sea and up to 100% of the total biomass, which increased by 2–3 times. However, in 2001 there was a sharp decrease in biomass as a species, and the whole of phytoplankton.

What is the relationship between these two species? Introduced *P. calcar avis* so quickly won the Caspian due to its large size and hard carapace: there was no phytophage able to eat its. Two species of small cell algae, *Rhizosolenia fragilissima* and *Exuviaella cordata*, remained under the pressure of grazing plankton and were pushed out. As a result, in spite of the increase in phytoplankton biomass, productivity of pelagic communities decreased and synthesized organic matter was supplied on bottom. But there was only one consumer in benthos, *M. lineatus*; its forage base is increased manifold, so its biomass increased too. So becomes clear that reason of *M. lineatus* biomass decrease in 2002 was decrease of organic matter supply. But what happened with *P. calcar avis* in this case?

In 1999, at boundary of the Middle and South Caspian the comb jelly *Mnemiopsis leidyi* was met. He actively colonized Caspian and in October 2000 reached the Northern Caspian, and its numbers around the sea increased sharply. *M. leidyi* is zooplanctivorous comb jelly; its feeding intensity depends only of the food availability. Comb jellies with excess swallow plankton organisms and regurgitate them half digested than multiplies the amount destroyed by zooplankton, and clusters of *M. leidyi* cause very serious damage to the plankton species populations. As a result of pelagic phytophages biomass sharply reducing the grazing pressure on phytoplankton reduced too. In such circumstances *P. calcar avis* lost its advantage, and in competition for nutrients yield small cell algae, so now its biomass is 6–4% of the total phytoplankton, which fell by 2–3 times.

Thus, the abrupt changes in abundance and biomass of invasive species depended on trophic relationships in an ecosystem.

INVASIVE FISH SPECIES IN THE CRIMEAN WATER RESERVOIRS AND THEIR IMPACT ON THE NATIVE ICHTHYOFAUNA

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The autochtone ichthyofauna of the inner Crimean water reservoirs, represented by 14 species existed as isolated from the continental one during a long period, which determined its endemic state and low diversity. Appearance of the alien fish is connected with different forms of human activity, it takes about 100 years and to the middle of the last century occurred as a result of fish introduction by man to the flow water reservoirs and ponds. At that period they introduced into artificial water reservoirs about 20 species of the market – precious fishes of the cold water (*Salmo*, *Coregonus*) and warm–water (Cyprinidae, Percidae, Esocidae, Poeciliidae) complexes (Delamure, 1964). Further wide expansion of the allochtone species is connected with construction of the many branched net of the North Crimean canal (NCC). Beginning from this moment the ichthyofauna on the peninsula crucially changed due to the planned, non – planned and non – sanctioned introduction and spontaneous invasion of the alien species with the Dnieper waters. More than 70 species have been registered during all the history of the Crimean ichthyofauna studies.

As a result of the monitoring studies from 2006 to 2012 we registered in the peninsula inner water reservoirs 50 species, of which 38 (76%) were adventives, these were fresh water, mainly reophobic species: *Polyodon spathula*, *Pseudorasbora parva*, *Rutilus rutilus*, *Ctenopharyngodon idella*, *Leucaspius delineatus*, *Rhodeus amarus*, *Scardinius erythrophthalmus*, *A. brama*, *Alburnus alburnus*, *C. gibelio*, *C. carpio*, *Hypophthalmichthys molitrix*, *H. nobilis*, *Tinca tinca*, *Cobitis taenia*, *Ictalurus punctatus*, *Silurus glanis*, *Esox lucius*, *Oncorhynchus mykiss*, *Gambusia holbrooki*, *Pungitius platygaster*, *Lepomis gibbosus*, *Perca fluviatilis*, *Gymnocephalus cernua*, *G. baloni*, *Sander lucioperca*; brackishwater and marine fishes: *Clupeonella cultriventris*, *Atherina pontica*, *Syngnathus abaster*, *Percarina demidoffi*, *Benthophiloides brauneri*, *Benthophilus stellatus*, *Knipowitschia longecaudata*, *Mesogobius batrachocephalus*, *Neogobius gymnotrachelus*, *N. kessleri*, *N. melanostomus*, *Proterorhinus marmoratus.*

In the rivers and water reservoirs of their basins (flow water reservoirs and ponds) they registered 26, in the water reservoirs of NCC system – 35 alien species. Maximal diversity of intruders is characteristic for lower parts of rivers with well warmed water and thick water plants, and in the lower Salgir river, serving as a discharge collector of NCC aborigine ichthyofauna is absent completely. Quantitative share of intruders at these parts makes averagely in the Alma river 81.9%, in the Kacha river – 51.2%, Belbek river – 36.9%. In the middle river flow intruders are not abundant and they are represented by 2–3 species, their abundance and diversity increase only at the parts close to the plane type, especially down the flow from the water reservoirs and ponds. In the upper flow of all the rivers alien species were practically absent. In the water reservoirs located at the plane part of rivers the number of allochtonic species reaches 10–12, some of them reach high abundance, in the mountain reservoirs they meet not more than 6–7 and usually they are not abundant.

Despite the abundance of invasive species in Crimean waters, their impact on native fish fauna is rarely catastrophic. They mainly occupied areas unsuitable for habitation of native species. Their food competition is not too significant, and of the negative factors we can mention predation of native species eggs. *L. gibbosus* makes an exception; being introduced without sanction into the water reservoir Gasfort (Sevastopol), it penetrated to the lower part of the Dry river flow, coming into this reservoir and within a few years really destroyed aboriginal ichthyofauna.

FUNGAL COMMUNITIES IN A FOREST AFFECTED BY INVASIVE SPECIES: A CASE OF GREAT CORMORANTS

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Diversity and composition of forest fungus communities were investigated at five zones, differently affected by the great cormorant colony situated in the northern part of the Curonian Spit, Lithuania. The aim of this study was to investigate the influence of a piscivorous bird colony on the above ground fungal communities. The investigated Scots pine forest was affected by different stages of breeding colony establishment: starting point and at present almost abandoned cormorant colony part, active part, the edge of the colony and the undamaged zone. The recorded diversity of fungi consisted of 257 taxa of Ascomycetes, Basidiomycetes and Zygomycetes.

The comparison of fungal species compositions of different zones showed that their similarity was rather low. Species richness of fungal communities was reduced in active part of the colony. The most obvious changes in the trophic structure of fungal communities in the territory occupied by the cormorant colony were the strong decrease of mycorrhizal species, the presence of coprophilous fungi on forest litter and the appearance of host specialized fungi on alien and non forest plants that have established in disturbed forest. In all strongly cormorant affected zones the stressed deciduous and coniferous trees were severely attacked by biotrophs. Fungal communities in the abandoned parts of cormorant colony were formed mostly by different species comparing to these of unaffected forest fungal communities.

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STUDY OF SOME MERISTIC FEATURES OF THE BLACK SEA CASPIAN KILKA (*CLUPEONELLA CULTRIVENTRIS*, CLUPEIDAE) INTRODUCED IN VOLGA RIVER RESERVOIRS

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The results of studies on the morphological variability in kilka (*Clupeonella cultriventris*) of the Volga River reservoirs are given. In the northward direction in newiy established populations, mean values of the number of vertebrae in the truncal part of the backbone (*vert. tr*.) and total number of vertebrae (*vert.*) increase. Presumably, the horizontal stepped cline according to vert. is detennined by differences in the thennal regimes in waterbodies during the first stage of the axial skeleton morphogenesis.Using the principal component analysis by a combination of-four features (*cs, vert. tr., vert. c., and vert*.) three groups of kilka populations were revealed: the upper middle Volga, the Rybinsk Sheksna, and the upper Volga. These groups reflect the adaptation process of the invader populations to new environmental conditions.

THE MACROFYTES COMMUNITIES OF BEAVER SETTLEMENTS ON THE TADENKA RIVER IN 2010–2013 YEARS

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The study of the species consist of macrofytes communities of Tadenka river conducted in the spring and summer seasons of Lamiaceae 2010–2011. Investigation of plant communities of Tadenka place over 6 km of the upper, middle and lower reaches. 24 stations have been identified with the most typical phytocenoses in which was studying the species consist, abundance, evaluation of projective cover used 72 test sites area of S = 4 m^2. Was sampling for determination of biomass (108 cuttings from the sites of S = 0.25 m^2 for which defined air dry and completely dry biomass to assess productivity.

Flora of high vascular plants of Tadenka's floodplain consists of 70 species belonging to 37 families, representing 8.49% of herbaceous flora of vascular plants of the Prioksko Terrasny biosphere reserve. Flowering plants are represented by 67 species from 58 genera 35 families, 1 species of ferns and two species of equisetum from 1 genus of 1 family.

The largest number of genera represented the family Poaceae, Ranunculaceae, Lamiaceae (5), family Apeaceae (4), Scrophulariaceae (3). The highest species diversity was observed in the family Cyperaceae (7), Poaceae, (6), Ranunculaceae and (5). Apeaceae family has 4 spices, Scrophulariaceae – 3. The greatest number of species of the genus consists of *Carex* (4), Persicaria*, Impatiens, Lysimachia, Veronica, Galium* include 2 species. Most species belong to ecological groups of wetland plants and plants of redundant moistened settlments.

In the watercourse was poorly represented subemerged plants: none of small amount of species except *Lemna mino*r is not characterized by high levels of abundance and occurrence. Also small number of species coastal aquatic plants but *Typha latipholia* and *Phragmites australis* are characterized by high abundance, creating homogeneous spinneys on a rather large areas. The majority of the number of species of aquatic plants belong to groups wetland plants and plants of redundant moistened settlments. The most abundant species: Urtica dioica is a plant of redundant moistenedsettlments and Filipendula ulmaria prefers wetlands. You should also note the presence in a number of plant communities described as mesophyties with low occurrence and abundance.

Analysis of the data on the biomass of macrophytes shows that the spread of its values is large in different plant associations.

In general, the studied floodplain and channel sections of Tadenka river characterized by a mosaic of vegetation, diversity of plant communities, concentrated in a relatively small space. In the upper reaches of the river, under the cover of black alder, projective cover of grass is low, a narrow strip along the shoreline sedge are quite common mesophytes. On the banks of beaver ponds, also under cover of black alder, are fairly large areas where sedges grow in association with *Impatiens parviflora* and *Impatiens noli tangere*. At several places along the banks of the ponds outside the forest shed has large areas occupied by homogeneous spinneys of *Phragmites australis*. In the middle reaches of the floodplain areas are occupied by almost homogeneous spinneys of *Sparganium erectum* and *Scirpus sylvaticus*, interspersed with areas of the floodplain, overgrown *Urtica dioica* and *Filipendula ulmaria*, cover a large area from the shoreline to the slope shore. Heterogeneity, diversity of plant communities, formed by herbaceous vascular plants in the floodplain of Tadenka river associated with long term impact of the construction and foraging of beavers having an impact on the course of succession in plant communities.

ECOLOGY OF *POLYGRAPHUS PROXIMUS* BLANDFORD (COLEOPTERA; CURCULIONIDAE, SCOLYTINAE) IN THE WESTERN SIBERIAN REGION OF INVASION

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The main reason for rapid degradation of Siberian fir forests during last decade is invasion of four eyed fir bark beetle *Polygraphus proximus* (Baranchikov et al., 2011). Its ecology was little studied in the boundaries of native habitat in Russia (Primorye, Khabarovsk Krai, Sakhalin and the Kuril Islands) as well as abroad (Japan, Korea, northeastern China) due to low economic significance there. Four eyed fir bark beetle is a minor pest of native tree species from genus Abies in the Far East, there it does`nt cause large scale mortality of healthy stands (Kurenzov, 1941; Niijima, 1941; Krivoluzkaja, 1958; Hara et al., 2008).

P. proximus outbreak foci in Western Siberia since its first registration in the Tomsk Oblast in 2008 were also found in conifer forests with different involving of fir in species composition and age structure in four regions: Kemerovo, Novosibirsk Oblasts, Altai Krai and Altai Republic. The main host tree of *P. proximus* in secondary habitat is Siberian fir – *Abies sibirica* Ledeb. (Baranchikov et al., 2011).

Under the laboratory conditions was shown that *P. proximus* can also breed on Siberian larch *Larix sibirica* Ledeb., Siberian stone pine *Pinus sibirica* Du Tour, Scotch pine *P. sylvestris* L. and Siberian spruce *Picea obovata* Ledeb. In 2012 bark beetles were also observed on the last three species of coniferous *in vivo*.

In stands *P. proximus* primarily infests wind fallen, wind breakage weakened and dying trees, but under high densities of population bark beetles can colonize healthy firs. Blue stain fungi vectored by fir bark beetle allows it to overcome tree defenses. The most aggressive among them is fungus *Grosmannia aoshimae* (Ohtaka & Masuya) Masuya & Yamaoka (Pashenova, Baranchikov, 2013).

Newly emerged emagous, pupa and larva of *P. proximus* overwinter under bark of a brood tree. The period of one generation – is around 1.5 months. Prolonged period of dispersal flight and potential bivoltinism allow to four eyed fir bark beetle infect suitable trees during the whole growing season.

Low population densities of previously numerous aboriginal dendrophagous (*Monochamus urussovi* (Fisch.) and *Xylechinus pilosus* (Ratz.) in *P. proximus* outbreak foci point out at competitive displacement of these species by alien insect.

There are found two species of ectoparasitoids affecting larvae of invader in Western Siberia – *Dinotiscus eupterus* (Walk.) and *Roptrocerus mirus* (Walk.) (Hymenoptera: Pteromalidae) and numerous obligate and facultative insects predators (Coleoptera: Staphylinidae, Histeridae, Nitidulidae, Tenebrionidae, Cleridae, Colydiidae, Cucujuidae; Hemiptera: Anthocoridae; Diptera; Lonchaeidae, Dolichopodidae). The most abundant predator of *P. proximus* in the region of invasion is – *Medetera penicillata* Neg. (Dolichopodidae). The species have been known before only from Primorye and Japan, obviously one was introduced in Western Siberia together with four eyed fir bark beetle.

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CONTROL OF INVASIVE ALIEN MAMMALS POPULATIONS IN EUROPEAN RUSSIA

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Currently there are more than 70 species of mammals, which can be attributed to the alien in different regions of Russia. Ten of them – priority target species (http://www.sevin.ru/invasive/priortargets /mamals.html) – require attention due to their aggressiveness, and often a vast zone of expansion. They are 7 species of rodents and 3 species of carnivorous.

5 species – Eurasian Beaver (*Castor fiber* L.), American Beaver (*Castor canadensis* Kuhl), Muskrat (*Ondatra zibethicus* L.), Raccoon Dog (*Nyctereutes procyonoides* Gray) and American Mink (*Neovison vison* Sch.) – occupy mainly natural habitats. All but the Raccoon Dog – semi-aquatic mammals. Degree and direction of impacts on ecosystems are still poorly known. There is information as negative and positive effects. Decision on measures to alien species management is taken depending on the situation in each case and each region. An approach to measuring the impact on the ecosystem and the calculation of costs are developing in different countries. These studies have been also conducted in our country, but their actual use, in our opinion, there will not be soon, because of the complex issues related to the management of natural ecosystems. The rapid growth of population number of these species leads to their penetration into the human settlements through close to natural habitats. In these cases, as a rule, alien species can be dangerous to humans: for example to its engineering constructions or health.

Need to be prepared to take specific measures to restriction of alien species in the emergency, especially if alien species penetrate in human settlements. These measures should be as sparing. Obviously, in many natural ecosystems, it is sufficient only to monitor of alien species. If necessary, can catching. In some cases, is appropriate science-based hunting, although its Rules are little developed in relation to alien mammal species. Of great importance is the creation of databases and education.

Other 5 priority target species – Striped Field Mouse (*Apodemus agrarius* Pall.), House Mouse (*Mus musculus* L.), Brown Rat (*Rattus norvegicus* Berk.), Black rat (*Rattus rattus* L.), Domestic Dog (*Canis familiaris* L.) – are significantly associated with the human population, especially the human settlements; House Mouse and Striped Field Mouse also with arable lands. Control of rodents in the urban areas has a long history and experience. But with regard to Domestic Dog many questions remain.

Each of the priority target species has its own history of the expansion and originality of emerging problems. There are also general problems: – high vitality of invasive species; – alien species have established and in the years after the invasion biocenotic relationships have formed, violation such relationships may lead to the destabilization of ecosystems; – increasing need for humane of measures of animal control; – others. There are differences in approach to the control of invasive mammal depending on the habitats that are ecological corridors for the expansion of invasive species. The most rigorous control of invasive species should be carried out in human settlements, especially in buildings. In natural ecosystems, it should be as far as possible indulgent.

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USING THE GIS TECHNOLOGY FOR STUDYING DIVERSITY OF ALIEN SPECIES IN RUSSIA (THE CASE OF MAMMALS)

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The concept of "alien species" is inevitably linked to the penetration of species into new areas for them. Therefore, many aspects studying of biological invasions involve geographical analysis of plant and animal distributions. GIS technology is powerful tool for storing, analyzing and visualizing spatial data. The GIS technology possibilities are constantly growing and improving.

We used GIS technology to solve a number of problems that arise in studying of alien species of mammals:

1. Analysis of the dynamic of range borders and construction of maps of range movements.

These maps have constructed in a vector format for the majority of alien species of mammals. They have been published (Bobrov et al., 2008) and presented at the WEB-site of the Severtsov Institute of Ecology and Evolution RAS. Some of maps have been improved and refined. For example, we changed the range maps of Kul`s pipistrelle (*Pipistrellus kuhlii*), Stone marten (*Martes foina*) and American mink (*Neovison vison*). GIS maps are document of invasions, and allow obtaining quantitative characteristics of mammal expansions. They are suitable for analyze of changes in the range boundaries of species-invaders depending on the features and dynamics of the other ecosystem components.

2. Analysis of changes in the population density of alien species in different parts of their range during settlement and naturalization.

Studies in this direction just started. There is not much data to construct maps of population density. Using results of accounting of minks in Russia, we have identified areas of maximum threats because of the invasion of the American mink. We also determined parts of American mink range, where increasing population density is over and in recent years there is a stabilization or decline.

3. Creating a geodatabase: diversity of alien mammal species in different regions Russia.

Using ArcGIS we created the geodatabase of diversity of alien mammal species in different regions Russia (Khlyap and al., 2011). With it, one can find a list of alien mammals, which in the second half of the 20th century settled in the selected region. The highest number of alien mammal species has been registered in the south of European Russia: there are spots where dwell up to 12 alien mammal species. Kamchatka has the second highest diversity of alien mammal species. The geodatabase of diversity of alien mammal species in Russia allows you to choose information about specific species or groups of species - taxonomic, ecological, etc. In addition we have transformed general geodatabase into a series of regional bases: diversity of alien mammal species in Caspian basin or the steppes of Russia. We have created also simplified versions of the geodatabase in pdf. Due to this the wider population can use our geodatabase in order to manage alien species, or for education.

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THE ROLE OF THE MECHANISM OF FORMATION OF THE SECONDARY RANGE IN PROVIDING CONTACTS BETWEEN THE POPULATIONS OF ALIEN PLANT SPECIES

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For a better understanding of the course of the invasion process, the territory, which is an area of introduction, should be considered as an "area of drift".

Under the "area of drift" we understand *a set of heterogeneous parts of the secondary ranges of alien flora species of the territory under study.*

Starting from this premise, we select 8 possible variants of the species get in the area of drift:
1. The single, one time grant drift from the primary range;
2. The single, one time grant drift from the secondary range;
3. Multiple, one time grant drift from the primary range;
4. Multiple, one time grant drift from the secondary range;
5. Multiple, extended in time drift from the primary range;
6. Multiple, extended in time drift from the secondary range;
7. The single, multiple drift from primary and secondary ranges;
8. Multiple, extended in time drift from primary and secondary ranges.

Analyzing the part of the Tula province with alien flora (327 species of vascular plants) from the point of view of the drift mechanism, we focus on the following:
1. Multiple drifts prevail over singles;
2. Drifts from the secondary range prevail over drifts from the primary range:
3. Drifts from one part of the range (primary or secondary) prevail over drifts from the both parts of the range;
4. Extended in the time drifts prevail over the single drifts;
5. Among the species with low naturalization status (N^0 – N^1) prevail the single drifting;
6. Among the species with naturalization status from N^2 to N^9 prevail the species, that multiple and extended in time drifting.

Thereby, above the presented set of random factors in the early stages of the secondary range formation is dominated and creates the preconditions for the appearance and beginning of the self-reproductions process, and then – for populations contact with each other.

At the stage of the appearance of the self-reproduction populations the inclusion of genetic mechanisms occurs. First of all, it is the gene drift and the gene flow.

In this connection, for further research we are interested in locating the "point", in which the switch-over of the secondary range formation mechanisms occurs from random factors to biological, including genetic ones.

THE DISTRIBUTION OF ALIEN FISH SPECIES IN THE WATERS OF NORTHERN BUKOVINA AND NORTHERN BESSARABIA (UKRAINE)

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Chernivtsi Region of Ukraine (territory of Northern Bukovina and Bessarabia North) is within the basin of the Dniester and the Danube. The latter is represented by drainage systems of the Prut and Siret.

Alien fish fauna of the region is represented by 12 species, combined in 7 families: Acipenseridae (1), Cyprinidae (5), Catostomidae (1), Ictaluridae (1), Salmonidae (2), Gasterosteidae (1), Odontobutidae (1).

Acipenser baerii Brandt, 1869 grown in fishfarms located in the floodplain of the Cheremosh River. Nearly 30000 Siberian sturgeon fry and 20000 bester were washed away from fishfarm during the flood in July 2008, resulting in 2008–2009 the sturgeon catching were reported in Cheremosh from Banyliv village to the mouth, and in the Prut River until the Costesti-Stanca Reservoir (Romania).

Hypophthalmishthys molitrix (Valenciennes, 1844), *Aristichthys nobilis* (Richardson, 1845), and *Ctenopharingodon idella* (Valenciennes, 1844) are grown in fish ponds. A distinctive feature of the structure of pond farms in the Chernivtsi region is the fact that almost all the ponds, with a few exceptions – the river bed. That is why during the passage of flood these species penetrate to the Prut and the Dniester from subordinate systems. In addition, since the end of the 80's of the 20th century to 2005, conducted stocking the Dniester Reservoir by Far Eastern herbivorous species. Reliable information on the naturalization of the above species in the hydroecosystems of Chernivtsi Region is missing.

Pseudorasbora parva (Temminck et Schlegel, 1846) reached the mass development in carp ponds, from which penetrated in the subordinate system of the Prut and the Dniester, with the mainstream of the rivers it is quite rare and in small quantities.

Carassius gibelio (Bloch, 1782) is ubiquitous in all rivers drainage systems in the region.

Ictoibus cyprinellus (Valenciennes, 1844) has episodic stocked in Dniester Reservoir in the late 80's of the last century.

Ictalurus punctatus (Rafinesque, 1818). The first and only find channel catfish dated May 2011, the top of the reservoir with the Dniester in front of Bilivtsy Ternopil region.

Parasalmo mykiss (Walbaum, 1792) in the Carpathian basins first appeared in the 80's of the 19th century. Since 1956, the rainbow trout grown in the Lopushna trout plant from which penetrated into the Siret River system basin. In the 2000's, rainbow trout resulting in the above specified enterprise is stocking in the Dniester Reservoir. Trout of businesses located in the basin of the Cheremosh, rainbow trout entered the mainstream of the Cheremosh and Prut.

Salvelinus fontinalis (Mitchill, 1814) are grown together with rainbow trout in a river basin trout farms where during a flood in 2008 the brook charr entered in the Cheremosh. Information about the naturalization of this species is available.

Gasterosteus aculeatus Linnaeus, 1758 in significant amounts recorded in the Buffer Reservoir of the Dniester. Occasionally occur in the upper part of the Dniester Reservoir.

Perccottus glenii Dybowski, 1877 in Chernivtsi Region distributed in additional systems of the Prut and the Dniester, mostly in ponds and adjacent parts of the rivers. Rod of company-brand penetration in the middle reaches of the Cheremosh. Juveniles found in the upper part of the Dniester Reservoir.

Thus, within Chernivtsi Region smallest number of alien species (2) is registered in the Siret basin and the highest (10) – in the Dniester drainage system.

INVASIVE AQUATIC MACROPHYTES IN WEST SIBERIA

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Elodea canadensis Michx. is the most known in West Siberia invasive aquatic weed, dissemination of which is connected with progress of lake fish culture. The first information about *Elodea* in Tyumen Region (in Pyshma River system) refers to the beginning of the 20th century (Krylov, 1927; Dobrokhotova, 1940). At present, according to A.A. Babushkin (2003), *Elodea* is a part of the vegetation cover in 41% subtaiga lakes and in 75% forest steppe freshwater lakes surveyed in Tyumen Region. Dominant species in submerged vegetation are changed: communities of *Potamogeton perfoliatus* L., *P. praelongus* Wulf. and *Ceratophyllum demersum* L. are replaced by *Elodea* ones (Babushkin, 2003).

However, on the other West Siberia territory east of Tyumen Region *Elodea canadensis* is known only from the single localities: in some points in Omsk Region (Zienkiewicz, 1956; Bekisheva et al., 2003; Evzhenko, 2011), in Kemerovo Region (in the vicinity of Novokuznetsk city) (Volobaev, 1990), Altai Region (Nizhnekamenka village) (Pyak, Ebel, 2000). The most likely reason for the lack of *Elodea* in the lakes of forest steppe and steppe zones of Novosibirsk Region is hydro chemical features of the lakes. Most of the lakes (including fishing and fish culture lakes) and rivers of the Ob Irtysh interfluve are brackish (salinity is over 0.5 g/dm^3), which are unfavorable for *Elodea*. In addition, calcium carbonate waters are optimal for *Elodea* (Biological invasions in aquatic and terrestrial ecosystems, 2004), whereas sodium chloride waters prevail in the forest steppe and steppe of Novosibirsk Region. Beyond that point the native species *Hydrilla verticillata* (L. f.) Royle is active in aquatic objects with the potentially favorable for *Elodea* hydrochemical parameters (Novosibirsk Reservoir, ponds). *Hydrilla verticillata* often forms dense thickets with high productivity. This species is native for warmer regions of Asia (Cook, Lüönd, 1982), but now it is almost cosmopolitan. In the 1960th it entered to United States and now *Hydrilla* is called the "perfect weed" there.

Thus, the main factors limiting the spread of *Elodea* in West Siberia are features of the hydrochemical composition and salinity degree of natural waters. Also the presence of aggressive native species *Hydrilla verticillata* in waters, potentially suitable for *Elodea* growth is important. Moreover, two species *Hydrilla* and *Elodea* are often defined incorrectly even by the botanists, as well as a pair *Myriophyllum spicatum* L. and *Myriophyllum sibiricum* Kom.

Vallisneria spiralis L. is another invasive species in West Siberia, which is now quite frequently reported in the cooling ponds of Siberia, Trans Urals and Europe (Zhuravel, 1974; Vaulin, Zubarev, 1979; Katanskaya, 1979; Volobaev, 1989; Protasov, Zdanovsky, 2001; Yanygina et al., 2010). This plant belongs to the group of thermophilic euro subtropic species, which areas has grown considerably due to an increase in amount of cooling reservoirs, exposed to the warm waste water influence. In West Siberia *Vallisneria* was noted in cooling ponds of Belovskaya and Southern Kuzbass power stations (Kemerovo Region). In Belovo Reservoir *Vallisneria spiralis* goes through all stages of ontogenesis, flowering twice a year (in April and October), creates a high biomass, and therefore adapted to the specific thermal conditions of the cooling reservoir (Zarubina, Sokolova, 2011). The appearance of this species in the cooling ponds is connected to the complex of favorable factors, the main one of which is an increased water temperature.

COMPARISON OF OCCURRENCE OF ALIEN SPECIES OF FISH IN THE WATERINTAKE OF DIFFERENT TYPE

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The twenty one alien species was registered in Cheboksary Reservoir since the 1950s. Currently 9 alien species naturalized (*Clupeonella cultriventris*, *Coregonus albula*, *Poecilia reticulata*, *Pungitius pungitius*, *Percottus glenii*, *Benthophilus stellatus*, *Neogobius iljini*, *N. melanostomus*, *Proterorhinus marmoratus*). *Osmerus eperlanus* disappeared from the catches in the 2000s, but it was numerous earlier. All of these species have spread across the waters of the reservoir and the lower reaches of the river Oka, forming the mass concentrations in some areas. However, if the magnitude of abundance and biomass have reliable information on the shallow waters of the reservoir, then the deep zone and river bed areas with strong current covered poorly by ichthyological researches. The datas on the occurrence of alien species in the various types of waterintakes can partially compensates the information. These aspects of the spread of alien species has not been used in the practice of ichthyology research until now.

We investigated four waterintakes with deep headwell at the Gorky and Cheboksary reservoirs and Oka river: 1 – coastal and riverbed 1 – trough on the river. Waterintakes were examined by us in the 1990s and in the 2000s (again) after the installation of the fish protection structures (shutter, air bubbles or pneumatic impulse). We selected from a large number of waterintakes studied pumping stations, water treatment with rotating grid. This allowed us to record the dead fish monthly or seasonally.

The total number of recorded species of fish on waterintakes is 24, including 7 alien species. The total number of species on the intakes with the deep headwell in different modes ranging from 5 to 12, on riverbed intakes – from 6 to 12, on trough intakes – from 15 to 24.

In 1990s we registered three alien species. The incidence of *O. eperlanus* at waterintakes reached 100% (11.4% of the total number of fish), *Cl. cultriventris* – 60% (4.7%), *N. melanostomus* – 20% (12.3%). These species have penetrated into the reservoir before others.

In the 2000s, the composition of alien species has increased to 6 (*O. eperlanus* is stopped). The high incidence and the proportion accounted fishes on waterintakes in the «off mode » of fish protection system is observed by *Cl. cultriventris* (100 and 7.8%), *N. melanostomus* – (80 and 19.5%) and *N. iljini* (40 and 2.9%).

The total number of fish recorded in wastewater treatment grids in the «on mode» of fish protection system is reduced by an average of 63.6% (from 0.333 to 0.121 ind./1000 m^3, including alien species from 0.036 to 0.013 ind./1000 m^3).

The proportion of alien species in the total number of fish (ind./1000 m^3) at intakes with the deep headwell is 57–85%, with riverbed headwell – 2.9%, with the headwell in trough – 6–13%.

We analyzed the species and size composition of fish recorded, and annual (seasonal) dynamics of their occurrence.

Cluster analysis of variables for performance clearly reflects the similarity/difference between the complex waterintakes. These indicators are the annual water withdrawals, the total concentration of fish entering the intake, the proportion of alien species, the Shannon index on the species diversity of the fish population. One cluster included the waterintakes of the Oka with the maximum of the annual intake of water and the maximum of alien species. The other cluster included the remaining waterintakes.

DYNAMICS AND STAGES OF MARENZELLERIA NEGLECTA INVASION IN THE VISTULA LAGOON, BALTIC SEA – 25 YEARS OF NATURALISATION

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Benthic invertebrate fauna of the Vistula Lagoon, one of two the largest lagoons in the Baltic, consist of euryhaline species of marine and freshwater origin, as well as a small number of typically brackish water species. Over the last century benthos of the Lagoon become more brackish water, in general. Species richness of main zoobenthic assamblages declined, while the proportion of alien species has increased [Ezhova et al., 2005]. The most ecologically significant invader during the last 25 years was the North American Atlantic species, polychaete *Marenzelleria neglecta* (Sikorski et Bick, 2004).

We have shown, the development of *M. neglecta* local population can be divided into several stages, differing by quantitative and qualitative characteristics:

1. Beginning of invasion, 1987 (presumably) – 1989. The first findings in the Strait of Baltiysk (1988), in the near mouth of the Pregola area, and in Polish aquatory. The numbers does not exceed 100 ind./m^2 [Zhmudziinski et al., 1993].

2. The exponential growth of the population, 1990–1994. Increase of the polychaete share in biomass of "soft benthos" began from 9% (1989) and reached to 97% (1992) [Rudinskaya, 2000]. Dense settlements of *M. neglecta* were marked not only in the Lagoon, but also in the low reach of the river Pregola, numbers of polychaete reach 12 000 ind./m^2 [Shibaeva, Potrebich, 1994].

3. Decrease of abundance, 1995–1997 [Rudinskaya, 2000].

4. "Plateau" stage. Almost the whole lagoon area is inhabited, except for the north eastern part, where *M. neglecta* individuals occur in benthos from early spring to mid summer. In 1998, the numbers was 1100–3000 ind./m^2, biomass consists of 5–75% of the total benthic biomass [Ezhova, 2001; Ezhova, Spirido, 2005].

5. Depression of local population. Since 2005, the numbers does not exceed 250 ind./m^2, biomass – 5 g/m^2. Average individual weight of polychaete was almost 10 fold less in 2002–2010 compared to 1997–2001. This indicates a declining of somatic growth and point out unfavorable conditions for population development over several years [Ezhova, Kocheshkova, 2013].

The range of salinity in the Vistula Lagoon is in tolerance limits for all life stages of *M. neglecta* [Peretertova, 1999]. The trophic limitation and spatial competition have not been identified, and the pressure of benthofagous fish species could only decrease over the study period, because on poor condition of bream and eel populations Thus, the most probable cause of the identified negative trend for biomass and numbers of the polychaete, is a long term temperature variability. It was found the statistically significant positive linear trend for the air and water temperature in the area of Vistula Lagoon (1997–2007), amounting to 0.09 and 0.17ºC per year, respectively [Stont et al., 2010].

The negative relationship between *M. neglecta* biomass/numbers (coefficient of correlation. –0.5 and –0.4 respectively) with water temperature was shown. Polychaetes of Marenzelleria genus are mostly distributed in the arctic and north boreal sea waters of the northern hemisphere [Bastrop at al., 1997]. Reproduction of *M. neglecta* in the Baltic Sea occurs during to the cold seasons of the year, in the Vistula Lagoon – from September to December. The marked increase of average seasonal and annual temperature, should be unfavorable for the somatic and generative production of a such relatively cold species. This is confirmed not only by the decrease of average biomass and density of the polychaete population, but also by reducing the individual animal weight of *M.neglecta* during study period.

SPATIAL TEMPORAL DYNAMICS OF SOME ADVENTIVES TYPES ON TAMBOV REGION TERRITORY

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The work presents the results of study of history and determination of modern status of some adventives types on Tambov region territory.

The material was the archive of state hunt inspection since 1964, scientific literature, data of 120th questionnaires from all administrative districts, and field works of the authors.

Raccoon dog (*Nyctereutes procyonoides* G.) was found in Tambov region in 1944 on territory of Morshansk district. The animal settled on all territory of the region by 1952. In 1960s the massive spread of the scabies was noted. At present time this animal singly can be found in forest areas on the north and east of the region.

American mink (*Mustela vison* S.) penetrated into the basin of the middle flow of river Vorona because of independent settling in the middle of 1990s. In 21st century the spread of the mink was noted all over Tambov area of Vorona's basin. There is no reliable information about the number of population and location of American mink in basins of other rivers. Coypu (*Myocastor coypus* M.) is imported in 1952 in order to semi free breeding. By 1955 the population was 300 species. There is no data about location and number of coypu on Tambo region territory. Muskrat *(Ondatra zibethicus* L.) was acclimated in 1946 in Tambov region, the animal was noted in many streams and reservoirs of the region in 1970s. In last decades the number goes around 100 110 thousand species, hunting is not developed. Ambrosia artemisifolia (*Ambrósia artemisiifólia* L.) was detected in 1997 for the first time. At present time the plant can be found on the territory of 14 districts of Tambov region. The most abundance characterizes the central, north and south eastern parts of the region. The precise time of Heracleum sosnowskyi's (*Heracléum sosnówskyi* M.) appearance on region's territory is unknown. At present it is distributed all over the territory, the places of Heracleum sosnowskyi's growth are roadsides (30%) and field edges (20%). Quercus rubra (*Quercus rubra* L.) is found in Tambov region mostly in shelter belts in 8 districts' territory. The age of encountered instances is not more than 50 years. Atriplex tatarica (*Atriplex tatarica* L.) is noted in all areas of Tambov region, 40% of them are marked by the mass distribution pattern. Cyclachaena xanthiifolia (*Cyclachaena xanthiifolia* N.) is noted for the first time in Michurinsk district in 1966. At present it is widespread in all areas. Chinese sleeper (*Perccottus glenii* D.) is firstly met in 1970s. In this century Chinese sleeper lives in the waters of almost all the districts of the region except for the south western areas. The increase of occurrence frequency of fish in the catch is widely noted.

The received data are the first quantitative, complex research of problem of adventization of flora and fauna of the region. On the base of received data the maps schemes of distribution, first meetings, places of releases of each considered type are built.

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INVASIVE PLANKTIC ALGAE IN THE INLAND WATERBODIES: SCALES, CAUSES, CONSEQUENCES

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Since the second half of XX Century active expansion of the ranges of some species of planktonic algae is observed in the freshwaters of Eurasia and North America. In last decades the number of alien species in the waterbodies (in particular in those ones where long term monitoring was performed) increased considerably. The neophytes start to develop actively transforming the structure of the aboriginal communities. Some invasive species may cause water blooms and are considered potentially toxic triggering serious environmental problems. The various vectors of introduction of allochthonous species (migrating animals, water traffic, transport with air masses, building of canals and reservoirs) exist for a long time. However the intensity of invasion of alien species started to increase only during last three decades.

To date about fifty phytoplankton species are considered invasive. These species include mainly blue greens (cyanoprocaryotes or cyanobacteria) and diatoms, seldom dynophytes, greens and raphidophytes. In Czech Republic 24 planktonic species are considered alien: ten cyanobacteria, nine diatoms, one dynophytes and four green algae; in the Volga River reservoirs (Russia) 15 invasive diatoms are reported; in the Great Laurentian Lakes (USA), 16 diatoms and one cyanobacteria.

The list of main invasive species of planktic algae includes cyanoprocaryotes (blue green algae): ***Cylindrospermopsis raciborskii*** (Wolosz.) Seenayya et Subba Raju (Syn.: *Anabaena raciborskii* Wołoszyn´ska, *Anabaenopsis raciborskii* (Wołosz.) Elenkin), ***Sphaerospermum aphanizomenoides*** (Forti) Zapomelova et al. comb. nov. (Syn.: = *Aphanizomenon aphanizomenoides* Kom. et Horecka, *Anabaena aphanizomenoides* Forti, *Aphanizomenon sphaericum* Kisselev), ***Anabaena bergii*** Ostenfeld (Syn.: *Anabaena bergii* var. *minor* Kiselev, *Anabaena bergii* f. *minor* (Kiselev) Kosinskaja), dynoflagellates, ***Peridiniopsis kevei*** Grigor. et Vasas 2001 (Syn.: = *P. corillionii* Leitao, Ten Hage, Mascarell et Coute,´ 2001; *P. rhomboides* Krakhmalny, 2002), raphidophytes, ***Gonyostomum semen*** (Ehr.) Diesing., diatom algae, ***Skeletonema subsalsum*** (A. Cleve) Bethge, ***Actinocyclus normanii*** (Greg.) Hust. and the species of genus ***Thalassiosira*** Cleve.

Intensive development of the majority of invasive species of planktonic algae is associated with highly trophic waters and maximal warming up of the water column during summer time. The direction of the main vectors of their expansion is from south to north. Modern consequences of fast transformation of aquatic ecosystems: increase in water temperature, mineralization and trophic state of the freshwaters determined both by natural (climate) and anthropogenic impacts trigger the expansion of species better adapted to the changed environmental conditions. In addition, increase in the surface discharge owing to increased atmospheric precipitation in the humid zone leading to the increase in the content of dissolved organic matter and water color (i. e. to the increase in humidization of territories), along with growing trophy, catalyze the southward range expansion of some boreal species.

INVASIVE SPECIES IN THE ICHTHYOCENOSIS OF THE WESTERN URALS WATERS

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The role of invasive species in the fish community Kama reservoir and adjacent bodies of water. Among those of the Black Sea Caspian *Clupeonella cultriventris* (settled up above the mouth of the Kama Vishery), Sander *volgensis* (met in the lower tail bay Votkinsk plant and river. White), *Perccottus glenii* (settled in small bodies of water), *Neogobius melanostomus* (below Kama HPP), *Ictalurus punctatus* (Karmanovo alkaline water reservoir, heated water area of Perm GRES in the Kama Reservoir), *Syngnathus nigrolineatus* (shallow water at the bottom of Votkinsky waters) and *Silurus glanis* (Votkinsky and Kama reservoirs), which disappeared in the second half of the XIX century and re emerged in the 70s. For ponds river White (Bashkortostan), as previously noted the presence of the *Pungitius platygaster* and *Coregonus lavaretus* (Bath Lake).

The low proportion of allochthonous fish fauna in Kama reservoirs (about 17%) compared with the Middle Volga, Dnepr and Don, because of the openness of most tributaries of the Kama and non transit nature of the upper basin (not taken into account hatchery facilities which do not form self reproducing populations, mostly juveniles sturgeon, *Hypophthalmihtys molitryx*, *Ctenopharyngodon idella*, *Cyprinus carpio*, *Parasalmo mykiss*, etc.). Attempts to acclimatize to Votkinsk reservoir *Coregonus peled* in the 70 ies. last century fishing effect is not caused.

Border spread of most invasive and Ponto Caspian and particle species, and the rotan can be tipped, mainly from south to north and up the tributaries of the Kama. A similar shift in the boundaries of areas of autochthonous species (*Pelecus cultratus*, *Blicca bjoerkna*, *Abramis brama*, etc.), reveal the influence of common factors on the distribution of fauna in the context of global climate reconstructions.

Variability of meristic characters invasive (*Perccottus glenii*, *Clupeonella cultriventris*, *Neogobius melanostomus*, *Silurus glanis*) in the majority of cases is within the amplitude of the native species area, while some biological characteristics (size, growth rate, fatness) in the invasive species could exceed the limits of species indicators (*Clupeonella cultriventris, Perccottus glenii*) in the initial phases of naturalization or are at a level such (*Silurus glanis*).

The influence of invasive species on fish productivity of water bodies in the appearance of anchovy fishing in the statistics, the growth of catch catfish in Votkinsk for three decades (up to 8.3 tonnes). The indirect impact is mainly due to a substantial proportion of anchovy in the diet of commercially valuable fish species (perch, chub, *Lota lota*, etc.) that affect the population dynamics during the 90's. to the present.

In the presence of water corridors (Catherine Canal, etc.) between the Kama River basin water systems in the recent past could be the source for the penetration of a number of species in Ponto Caspian basin N. Dviny and Pechora – *Alburnus alburnus*, *Abramis sapa*, sabrefish, *Leuciscus cephalus*, *Scardinius erythrophthalmus*, *Alburnoides bipunctatus*, *Aspius aspius* of the Universe as well as deliberate *Acipenser ruthenus* and *Sander lucioperca*, as well as the European species in the tributaries of the Ob (*Leucaspius delineatus*, bleak, encountered in the river Iset, Sisert etc., along with directional acclimation ponds in Siberia perch, *Cyprinus carpio* and bream, which greeted us in the Ob Bay in non aqueous into account the number of whitefish in 1996 to 66º30'N.

Faunogenesis in the waters of the Western Urals at the present stage occurs predominantly by way of weak competitive evolution, in which the naturalization of species in most cases due to the presence of free ecological niches.

MODERN STATE OF ALIEN FISH IN THE SYRDARYA RIVER WATERSHED

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Introductions of alien fish species in the Syrdarya watershed were passed several times during the XX th century. There were data about introduction of 22 species. Investigation of the modern diversity of alien fish species here was the purpose of our researches.

Materials were collected in the 2002, 2005, 2007 and 2012 in the Syrdarya River and inflows like Arys, Arystandy, Badam, Boghen, Keles, Karashyk, Mashat, Sarybas, Saiyram su and Toguz rivers. Drag net, gill nets and net were used for fish catchments. Indexes of fish fauna diversity were calculated according Shennon and Simpson.

The biggest diversity of fish fauna were observed for the Boghen and Arystandy rivers and the least diversities were found in the mountain parts of the Karashyk, Mashat, Saiyram su and Sarybas rivers. Significant differences in fish fauna of the Syrdarya River and it inflows was revealed. As a whole result, dominance of indigenous fish species was shown. Alien fish species were presented with rather small number of species.

Nowadays alien fish species like grass carp ***Ctenopharyngodon idella*** (Valenciennes, 1844), silver carp ***Hypophtalmichthys molitrix*** (Valenciennes, 1844), bighead carp ***H. nobilis*** (Richardson, 1846) and snakehead ***Channa argus*** (Cantor, 1842) have commercial abundance. Starry sturgeon ***Acipenser stellatus*** (Pallas, 1771), black carp ***Mylopharyngodon piceus*** (Richardson, 1845), yellowcheek ***Elopichthys bambusa*** (Richardson, 1845) and spotted steed ***Hemibarbus maculatus*** Bleeker, 1871 were not found during the investigation period. It is well known for the native areal that European flounder ***Flounders flessus*** (Pallas, 1811) lived in the rivers too, but no times this fish was found in the Syrdarya River. Noncommercial species like big scale sand smelt ***Atherina boyeri caspia*** (Eichwald, 1831) and monkey goby ***Neogobius fluviatilis*** (Pallas, 1811) inhabited in the Small Aral Sea and in the lakes of its lower reach. Assumption on the ***Anabarilius polylepis*** (Regan, 1904) naturalization in the river was not confirmed.

Three lips ***Opsariichthys uncirostris amurensis*** (Berg, 1932) inhabited in the Syrdarya river but was not numerous. Unplanned invaders like China goby Rhinogobius chenii, stone moroko ***Pseudorasbora parva*** (Schleger, 1842), ***Micropercops (Hypseleotris) cintus*** (Dabry de Thiesant, 1872) and bitterling ***Rhodeus*** sp. Inhabited in the river as well as in it inflows.

Eastern mosquitofish ***Gambusia holbrooki*** (Girard, 1859) and rice fish ***Oryzias latipes*** (Temminck et Schlegel, 1846) expanded in the whole river from the Sharadara water reservoir to the mouth and inhabited among submerged water plants.

On the whole, results of our investigation shown that alien fish species did not become dominants despite on the strong negative human impact on the river ecosystem.

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INVASIVE SPECIES OF TINTINNIDS FROM THE SEA OF AZOV

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In the last decades the number of finds of invasive species increased on an aquatorium Black and Azov seas. The aquatoriums of large ports are most liable to invasion, because of high traffic of freight courts. From 2002 taxonomical composition of tintinnids of sea of Azov was filled up by three species. In 2002 gs in the living tests collected on the aquatorium of sea of Azov, the representatives of Eutintinnus lususundae Entz were met, 1885 (Kreneva, 2003). It is presently possible to talk that a species occupied the ecological niche and gained a foothold in the ecosystem of sea of Azov, because in a warm season regularly meets on the open aquatorium of sea.

In autumn of 2011 we found out two types of tintinnids before not meeting on the aquatorium of sea of Azov – *Tintinnopsis tocantinensis* Kofoid & Campbell, 1929 and *Eutintinnus pectinus* Kofoid, 1905.

Form and sizes of lorica from the sea of Azov, on results measurement (25 ind.) similar with literary (Fernandes, 2004; Selifonova, 2011), but differ from Black sea standards a bit by a greater width. Length of lorica makes 130 µm (124–135), maximal diameter of lorica 35 µm (34–36), diameter of the oral opening of 23 µm (22–24), correlation of length and oral diameter 5.6.

Tintinnopsis tocantinensis was marked in the district of the Kerch channel and in north eastern part of sea of Azov. The total number of organisms was not high 200–400 ind./m^3.

Simultaneously with T. tocantinensis on all aquatorium of sea of Azov, except the Taganrog bay, was marked Eutintinnus pectinus. This species was described Kofoid for the district of SanDiego region and Chesapeake bay (Kofoid, 1905, 1919) as Tintinnus serratus Kofoid, 1905. In the Black sea this species while not found out.

Lorica of infusorian has a form of the poorly truncated cone or cylindrical, open from both ends. The wall of house is homogeneous, transparent. An oral end has a toothed edge.

Form and sizes lorica E. pectinus differ in a minimum variableness and similar with an Atlantic form on Kofoid (Kofoid, 1919), but hardly less than. Length of lorica makes 135 µm, diameter of the oral opening of 18 µm, diameter of the aboral opening of 13 µm.

In October 2011 we looked after mass development of this species. In central and western part of sea his number hesitated from 1.5 to 2.2, on the average 1.7 mill. Ind./m^3. And in east part of sea, at the temperature of water of 14ºC, the total number of organisms was 28.8 mill. Ind./m^3.

Thus for the last 10, tintinnid communities of sea of Azov was filled up by three species.

TRANSFORMATION OF TAIGA ECOSYSTEMS IN WESTERN SIBERIA DURING THE INVASION OF FOUR EYED FIR BARK BEETLE *POLYGRAPHUS PROXIMUS* BLANDF. (COLEOPTERA: CURCULIONIDAE, SCOLYTINAE)

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The recent detection of outbreaks of Far Eastern four eyed fir bark beetle *Polygraphus proximus* in dark coniferous forests in a few regions of southern Siberia (Baranchikov, Krivets, 2010; Baranchikov et al., 2011) is a belated evidence of latent invasion of this species into new habitats in last decades.

In 2011–2012 we have explored the plains fir forests of Western Siberia, affected by four eyed fir bark beetle. At the same test plots in outbreak foci of *P. proximus* with different intensity of damage in south of Tomsk Oblast was studied interrelated transformation of major components of forest ecosystems: tree stands, fir undergrowth, and living grown layer of vegetation.

In the outbreak foci *P. proximus* causes a dramatic change in vitality structure of stands. The death of fir trees according to the time of focus formation ranges from 30 to 90%. The share of healthy trees usually less than 20%.

Polygraphus proximus has both influences on fir undergrowth in result of direct attacks at the trees with simultaneous introduction a phytopathogenic fungi under the bark (up to 60% of trees of the lower tier), and also indirect through changes of ecotopes conditions. The undergrowth vitality depends on the level of stand degradation. Increase of illumination of habitats due to mass drying of mature trees has negative impact on the young fir trees, which are shade tolerant, and adapted to the development under the parent fir stand canopy. In completely degraded forests fir seedlings are absent; death of undergrowth reaches 40%, a prerequisite to replace coniferous by deciduous tree stands.

Changes of the living ground cover are also mainly related with an increase of illumination. In a slightly disturbed fir plantings still remain low grass plant communities with predominance of taiga short grass species, similar to the primordial intact forests. Increase share of variiherbetus and magniherbetus are observed in damaged stands as a result of outbreak focus development and reduction of crown density. In cases with maximum extent of fir stands transformation variiherbetus, fern variiherbetus communities are formed. The features of these plant communities are increase of abundance of large ferns, high grasses, forbs, and forming of dense shrubs at lightening areas and near dead trees. This also affects the natural regeneration of fir.

Thus, four eyed fir bark beetle affecting various components of forest biocenoses causes significant qualitative and quantitative changes in dark coniferous forests, and is important factor of modern zoogenic successions Siberian taiga ecosystems.

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INTERACTIONS BETWEEN INVASIVE PLANT *HERACLEUM SOSNOWSKYI* AND NATIVE SPECIES OF INSECTS IN MOSCOW REGION

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One of the suppositions for quick distribution of invasive plant species – in this study Heracleum Sosnowskyi – is the absensce of native insect phytophagous species capable to hold them. Our observations on giant hogweed on the territory of Moscow Region showed that many insect species normally visit this plant. So we set the following tasks: 1) to study the complex of insects visiting Heracleum Sosnowskyi; 2) to compare these insects with those registered on other species of the family Apiaceae on the same territoty: *Pastinaca sativa*, *Angelica sylvestris*, *Levisticum officinale*, *Aegopodium podagraria*, *Anethum graveolens*, *Carum carvi*, different sorts of *Petroselinum* sp., *Apium* sp., *Coriandrum sativum* and others; 3) to discover insect species for which the tissues of invasive plant are suitable for feeding and as a result to find insect species capable to realize complete life cycle on Heracleum Sosnowskyi; 4) to test different methods of attractation of phytophagous insects to giant hogweed; 5) to evaluate the possibility to use these species for the control of the invasive plant. This report concerns the insects capable to develop on Heracleum Sosnowskyi though under natural conditions they prefer and choose other species of Apiaceae or wider set of plants. Several experiments were fulfilled with active flying adult stage of insects (beetles *Agapanthia villosoviridescens*, *Lixus iridis*) and immature stages of Lepidoptera – caterpillars (*Depressaria radiella*, *Papilio machaon*). In the first case we closed the plant completely with special cage of transparent aerated material to prevent insects from leaving it and put inside 10–20 copulating pairs of beetles; then we inspected periodically such systems during vegetative season. In the second case we placed eggs or caterpillars of the first instar on closed or opened plants and fulfilled further monitoring on them. The results are as following: polyphahous beetle *A.villosoviridescens* when it was devoid of the opportunity to choose the host plant itself laid eggs on Heracleum Sosnowskyi, larvae developed inside stems, preferring stems of small diameter, then they pupated, hibernated and imagoes emerged in spring. Oligophaous beetle *L.iridis* demonstated the same behaviour, with the exception that the imagoes appeared at the end of summer. The caterpillars of *D.radiella* in the amount of 3 exemplars on one umbel of plant were capable to destroy to 100% of flowers, ovaries and seeds, they pupated at the end of summer, adults emerged at the end of summer too. Caterpillars of *P.machaon* in our experiment tried to leave the plant as soon as possible and did not feed on umbels. In the experiment when we settled the plant with the former 3 species of insects simultaneously we observed the depression of the invasive plant.

BIOLOGICAL FEATURES AND INVASIVE ACTIVITY OF THE PLANT SPECIES IN THE NORTH AMERICAN GENUS *CENCHRUS*

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The grass genus *Cenchrus* is a very complicated in the taxonomical relation and including at least 20 species representing annual or perennial plants belonging the tribe Paniceae R.Br. Most species are distributed throughout the Western hemisphere in the places with humid climate, drainage sandy soils, on the seaside. They are heliophiles, cenophobes, erosiophiles and are occupied on the beaches, dunes, roadsides, waste in the natural habitats.

Some species have widely extended into the world like as invasive weeds and have found in South America, Asia, Europe, eastern part of Africa, New Zealand, Australia, Tasmania. The genus is readily divided into two well marked groups. First one include species which have spikelets enclosed inside soft flexible fascicles and what have been used in the tropics as sown pastures (*C. ciliaris* L., *C. pennisetiformis* Steud, *C. setiger* Vahl). Second group is likely to cause harm to human health and create problems for making agricultural production. This is so called spiny tribe – *Cenchrus longispinus* (Hackel) Fernald, *C. pauciflorus* Benth., *C. incertus* M.A. Curtis, *C.echinatus* L.. The fascicle where are spikelets has formed expanding bases of the spines and it looks like the rigid copula with retrorsely scabridulous sharp bristles. There are ripe seeds inside the fascicle and ones germinate there. Seeds give seedlings by portions during some years. The fascicle itself remains in good view in the soils and doesn't rot.

The biological features representatives of the genus that provide high competition and invasive activities are: short life cycle, flowering and fruiting some times for the season, high seed production (about 3000 seeds for 1 plant), nonsimultaneous seedage (conservation seed bank in soil during 5 year), light weight and floatation of fascicles and their good attached to wool of animals, resistance plants to drought and heat, the ability to form adventitious roots on stems.

Populations of *Cenchrus* in the Europe were initially found in 1930 in Italy. In 1950 *Cenchrus* was locally recorded in Ukraine. Nowadays this weed has been often spreading among different crop plants, in gardens, in vineyards, where really reduces their productivity; on the urban territories (sandy beach and embankments) delivering inconvenience to people due to sharp spines. The most dangerous fact – *Cenchrus* starts to intrusion to natural plant communities of sandy steppes, what can be cause to change their structure and composition, transforming native landscapes.

In the Russian Federation representative of the genus *Cenchrus* is relatively recent newcomer and was only locally established on the railway in Krasnodar in 1991. Now there are some places, where we can seen this invasive weed (in 5 cities and 6 localities on the territory of Krasnodar district and Volgograd, Belgorod and Stavropol areas).

Cenchrus is undesirable plants for pastures and in the feedstuff for livestock, because can cause mouth ulcers of ones. So it is important to prevent invasion of *Cenchrus* on the river sands and sandy steppe in the south regions of Russia.

PROBLEM OF IDENTIFICATION AND EVALUATION OF CONSEQUENCES OF AQUATIC INVERTEBRATES INVASIONS IN THE WATER BODIES OF THE GULF OF FINLAND (BALTIC SEA) WATERSHED

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Invasions of alien species in aquatic ecosystems of the Gulf of Finland watershed is a significant factor of changing in water bodies natural environment and conditions of their water and biological resources practical use. In this regard, it is important to have and apply research approaches, which allow to identify and impartially evaluate changes that happen in the ecosystems following naturalization of alien species. The largest European fresh water body, Lake Ladoga, deserve special attention in this respect. In the recent years, the number of invasive species found in lake Ladoga and the Gulf of Finland has been rapidly increasing, with some new species reached significant abundance (e.g. amphipods *Pontogammarus robustoides* in Lake Ladoga and *Gammarus tigrinus* in the Gulf of Finland). At present, 4 species of alien amphipods already dwell in the lake: *Gmelinoides fasciatus*, *Pontogammarus robustoides*, *Chelicorophium curvispinum*, and *Micruropus possolskii*. Furthermore, invasive species are found in meiobenthos, zooplankton, aquatic macrophytes, and periphyton. It is shown that nowadays the alien hydrobionts are an important factor of transformation of Lake Ladoga ecosystem.

In the framework of assessment of aquatic invasion hazards in the European inland and marine water bodies multiple indices are designed and proposed to use, aimed at assessment of the impact of alien introductions and the corresponding ecological status of water body (i.e. degree of transformation by aliens) from different points of view.

The present work aims to reveal real changes in littoral zoobenthic communities of Lake Ladoga, the Gulf of Finland, and the Luga River, and to match them with a formal assessment of the degree of transformation by the previously proposed indices of biological contamination. We examined the correspondence of the thesis about the impact of invasive species on biodiversity with data on co occurrence, ecology and abundance of invasive and native species.

Biological contamination of the coastal zone of Lake Ladoga and the Gulf of Finland is formally assessed as high. Contrarily, multivariate analysis of benthic communities showed no significant influence of the most common and numerous invasive species on α and β diversity. Influence of invasive species on the distribution of native species was not revealed as well. Moreover, for the coastal habitats of Lake Ladoga ameliorative effect of invasive species is described. At the same time, it is shown that the abiotic parameters have significant impact on the distribution of both indigenous and nonindigenous species. Thus, despite the fact that invasive species, including those revealed on the investigated area, can significantly reduce the local abundance of native species through competition, predation, and other mechanisms, in the case of littoral habitats of the Gulf of Finland and Lake Ladoga we conclude that there is no significant negative impact of invasive species on overall diversity of native communities. Evaluation of consequences of biological invasions in aquatic ecosystems should be individualized for each water body with compulsory study of biology and ecology of established invasive species.

SIGNIFICANCE OF ALIEN SPECIES IN THE STRUCTURE OF MACROZOOBENTHOS COMMUNITY OF THE KUYBYSHEV AND SARATOV RESERVOIRS

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Changes in the taxonomic composition, abundance, and distribution of macrozoobenthic alien species in reservoirs within the Middle and Lower Volga River according to our study as well as published and unpublished data over the period of 1958–2012 are presented.

At present, all the reservoirs are classed as meso /eutrophic. The last decade is characterized by a sharp decrease in total biomass of the macroinvertebrate communities (23.5 g/m^2 in 2002 and 6.3 g/m^2 in 2009 in the Kuybyshev Reservoir). The pronounced decrease in the total density and biomass are recorded for oligochaetes, chironomids and crustaceans.

The relative contribution of alien species to the total macroinvertebrate density and biomass is about 75% and 56%, respectively, in different areas of the Kuybyshev Reservoir, 65% and 75% – of the Saratov Reservoir.

The number of alien species in the Volga River basin increases as the result of both natural and anthropogenic processes. For the last five years, 21 colonizer species have been recorded in the Kuybyshev Reservoir, 26 in the Saratov Reservoir, and 24 in the Volgograd Reservoir. The alien species are represented by polychaetes *Hypania invalida* and *Manayunkia caspica,* oligochaete *Potamothrix vejdovskyi,* leeches *Archaeobdella esmonti* and mollusks *Dreissena bugensis*; *D. polymorpha*; *Monodacna colorata*; *Lithogliphus naticoides* and *Theodoxus astrachanicus*. For the first time during the last years, amphipods *Dikerogammarus caspius, Stenogammarus dzjubani, S. compressus, Shablogammarus chablensis, Chaetogammarus warpachowskyi,* mysids *Katamysis warpachowskyi* and the cumacean *Pseudocuma cercaroides, Caspiocuma campylaspoides* were recorded in the reservoirs. The amphipod *Pandorites platycheir* was recorded only in the Volgograd Reservoir and the lower Volga River.

Polychaete *Hypania invalida* has reached a high population density in most of the ecotopes, preferring dirty sands and silty sediments of the riverbed and sands of open shallow areas, and comprising more than 35% of total “soft” benthos biomass on both riverbed and bottomland areas.

Amphipod *Chaetogammarus warpachowskyi* may be defined as a species expanding its range in the system of Volga River reservoirs. The same characteristics may be given to mollusk *Lithoglyphus naticoides*, which exhibits a high population density in sand ecotopes of shore areas of the Saratov and Kuybyshev Reservoirs.

The alien species mentioned above are mostly omnivores (zoo/phytophages, omnivorous scrapers/snatchers – amphipods, cumaceans, mysids), detritophagous filter feeders (*C. curvispinum, D. haemobaphes, D. caspius*), and phytodetritophagous gatherers (*T. astrachanicus, L. naticoides*), and thus the food resources are not the limiting factor for them to naturalize successfully. The dissemination and success of these species is mostly limited by their ecotope preferences and optimal temperature conditions.

The life history traits that distinguish the alien amphipods consist mainly of high fecundity (big brood size and high partial fecundity), early maturity and elevated reproductive rate (large numbers of generations per year). In addition, most of these Ponto Caspian amphipods are relatively euryhaline and eurybiont – features making them preadapted to invade new environments.

Thus, adaptation and naturalization of alien species occurs simultaneously with structural changes of macrozoobenthic communities and destabilization of populations’ structure of many indigenous species. In this connection, forecasting of possible consequences of the colonization of invading species remains one of the most actual problems for the Volga River basin study.

ALIEN SPECIES IN THE FISH FAUNA OF KYRGYZSTAN

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Specific structure of the fish fauna in Kyrgyzstan is not numerous, but quite diverse and is characterized as typical for the fast mountain rivers. This definition was given by G.U. Lindberg (1936) after a work of the Ichthyologic group in 1933. During the study of fish fauna of Kyrgyzstan, the number of registered species was increased. In the first fish check list, which was published in 1935 by P.P. Dementjev, for Talas River there were listed 10 species, for Chu River 20 spp., for the Naryn River 17 spp., and for the Tarim River basin 7 spp. 10 fish species were registered in Issyk Kul Lake (Pivnev, 1990). Excepting the species common for all pools, all for the country in the list 44 species of fishes were specified. With creation in 1947 of laboratory of ichthyology studying of specific structure of a fish fauna of Kyrgyzstan under the leadership of the member correspondent of Academy of Sciences of KirgSSR of Prof. F.A.Turdakov was wearing planned character. At present the list of species in the fish fauna of Kyrgyzstan has 70 taxa (List vertebrates Kyrgyzstan, 2010). Together with the subspecies which taxonomical status demands audit, 85 names are presented in the list.

The cause of the alien species in any ecosystem is generally accepted to consider acclimatization measures in the first place, and the second – self moving of acclimated invasive (Kudersky, 1972). Before the process of acclimatization measures planned (middle of the last century to the present) in the fish fauna of Kyrgyzstan already was 58 species and subspecies of fish, among them such acclimatized fish as Sevan trout, tench, bream, mosquito fish (Lindberg, 1936; Turdakov, 1963). Following biological justifications to planned installation fishes in reservoirs of Kyrgyzstan, proposed for increasing fish production fishery waters (lakes, reservoirs and ponds), acclimatized were 18 commercial and 12 noncommercial, accidental or self settled species of fish. The main planned works on an introduction of new species of fish were carried out on the Lake Issyk Kul with the purpose to turn this unique reservoir with an endemic fish fauna in trout whitefish fauna (Konurbayev and others, 1972). Except introduced Sevan trout in 1930–1936, since 1956 to the lake were installed a pike perch, Samarkand khramulya, a whitefish ludoga, peled, Baikal cisco, a cultural form of carp, rainbow trout. To the mountain lake Song Kel were installed peled, a whitefish ludoga, broad whitefish, and large whitefish. In the Toktogul reservoir was infused Siberian sturgeon, grass carp, silver and bighead carp, Sevan trout. In Chui ponds of fish farms in Uzbekistan and Kazakhstan was imported fingerlings cultured herbivorous fish. As a result, in the reservoirs of Kyrgyzstan appeared acclimatized accidental invaders – have become traded bream, tench, sabrefish, Balkhash perch, goldfish and the non traded bream, bitterling, Amur goby, abbotina river, eleotris Chinese, snakehead, psevdorasbora, vostrobryushka Korean, gambusia, firebrand. The part of the installed fishes – Samarkand khramulya, Baikal cisco, whitefish, Siberian sturgeon – could not acclimate to the new conditions. Other part of the installed fishes – a whitefish ludoga, peled, and trout filled up specific structure of food fishes. To introduce alien species also change the settled zoogeographical boundaries of the Mountain Asian province, allocated due to the unique composition of its fish that inhabit the waters of Central Asia.

THE ORIGIN OF THE CHINESE SLEEPER *PERCCOTTUS GLENII* (ACTYNOPTERYGII: ODONTOBUTIDAE) POPULATION IN UKRAINE, BASED ON THE PARASITE FAUNA DATA

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The Chinese sleeper *Perccottus glenii* Dybowski, 1877 (Actinopterygii: Odontobutidae) is an invasive fish species indigenous to the freshwaters of the Eastern Asia from the Sea of Okhotsk basin in the North, to the Yellow Sea basin in the South (Mori, 1936; Berg, 1949). Now the invasive Chinese sleeper is widely distributed in the freshwaters of Eastern and Central European countries, such as Belarus, Bulgaria, Estonia, Hungary, Lithuania, Latvia, Moldova, Poland, Romania, Russia, Slovakia, Serbia, and Ukraine where it has high climatic suitability and may continue invasion in the future (Reshetnikov and Ficetola, 2011). The parasites of the Chinese sleeper were studied in 6 localities in different parts of Ukraine. In total, 15 taxa of parasites were registered, among them were 1 species of Microsporidia, 5 species of ciliates, 2 species of cestodes, 2 species of trematodes, 2 species of nematodes, 1 species of acanthocephalan, 1 species of parasitic crustacean, and 1 mollusk (glochidia). The non indigenous cestode *Nippotaenia mogurndae* occurred in intestine of the Chinese sleeper from the Ivachiv Reservoir (Dniester River basin). The parasite communities of the Chinese sleeper in different localities of Ukraine are characterized by low similarity. The relatively high similarity is between the Desna River, the Novosilky Pond and the Danube delta, due to the presence of *S. contortus* and *H. luhei*. The Chinese sleeper population in the upper Dniester River basin is the oldest in Ukraine, where it was first reported in 1980. This is only region, where the Asian cestode *N. mogurndae* occurred.

THE FIRST RECORDS OF CYANOBACTERIA *PLANKTOLYNGBYA BREVICELLULARIS* CRONB. ET KOM. IN THE CURONIAN LAGOON OF THE BALTIC SEA

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Freshwater filamentous cyanobacterium ***Planktolyngbya brevicellularis***, an inhabitant of the plankton of eutrophic water bodies, was firstly recorded in the Baltic region in the lakes of southern Sweden in 1994 [Cronberg, Komarek, 1994]. Later the species naturalized in some limnic basins in North West Russia: in the Lake Peipsi and Narva Reservoir, in quantities from 2.3 to 22 times greater than those of the indigenous species *Planktolyngbya limnetica*. *P. brevicellularis* accompanies blooms of *Microcystis aeruginosa*, *Planktothrix agardhii* and *P. limnetica* [Ecosystem…, 2008; Belyakov, 2008]. In 1998–2003, the cyanobacterian community of the urban Lake Jeziorak Mały (Mazurian Lakeland, north eastern Poland) was dominated by three species: *Limnothrix redekei*, *Aphanizomenon gracile* and *P. brevicellularis*. The vegetation of the last one defined profoundly the reduction of orthophosphate concentration in the water [Zębek, 2006].

In accordance with long time studies of the phytoplankton of the hypereutrophic Curonian Lagoon, cyanobacterium *P. brevicellularis* was not found in the plankton in 1980–1995 [Olenina, 1996], and 1989–2001 [Semenov, Smyslov, 2005]. According to our data, in 2011 the species had already naturalized in the lagoon ecosystem. The highest level of its vegetation occurred in the summer autumn season: August–October – 7.8–70, while in February–July – only 0.1–0.9 mln.cell/l.

As a possible source of the invasion of *P. brevicellularis* into the Curonian Lagoon, the Mazurian Lakeland (Poland) is considered. Its flow is mainly directed at the basins of the Vistula and the Pregola, an arm of the latter, the river Deyma, falls into the freshwater Curonian Lagoon. There, unlike in the brackish Vistula Lagoon, exist some auspicious conditions for the development of *P. brevicellularis*.

ON FEEDING PECULARITIES OF *MARENZELLERIA NEGLECTA* (POLYCHAETA: SPIONIDAE) AND *RANGIA CUNEATA* (MOLLUSCA, BIVALVIA: MACTRIDAE) – INVASIVE BENTHIC SPECIES IN SHALLOW LAGOON ENVIROMNENT

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In 1988 polychaeta *Marenzelleria neglecta* (Sikorski, Bick, 2004) invaded the Vistula Lagoon, one of the largest lagoons of the Baltic Sea, then successfully established and until 2010 was one of the dominant/subdominant species of lagoon benthos, constituting up to 90% of the benthos biomass. In 2011, we recorded a new alien species – clam *Rangia cuneata* (GB Sowerby I, 1831), who was absent in benthic samples in July 2010 [Ezhova, 2012]. *R. cuneata* has come to dominate almost all benthic lagoon communities, its maximum biomass exceeded 800 g/m^2 in summer 2011.

It is believed, in dynamically changeable coastal environments, polychaetes of Marenzelleria genus are able to change its feeding pattern, depending on habitat conditions. Like many other spionid, *M. neglecta* is usually regarded as selective deposit feeders, which is able to switch between different feeding mode. The contribution of different mode of feeding into diet of the worm and switching triggers are unknown till now. Strong positive correlation between the polychaete abundance and phytoplankton density and chlorophyll a concentration were found in the Southern Baltic [Kube et al., 1996]. These authors have concluded, *M. neglecta* realizes suspension feeding when concentration of phytoplankton is high, and the trigger is a concentration of phytoplankton cells. In a specific environment of shallow eutrophic the Vistula Lagoon feeding mode of *M. neglecta* and *R.cuneata* has not been studied before our study.

Totally 35 taxa of microalgae (diatoms – 27, greens – 6, cyanobacteria – 1 zoomastigofora – 1), as well as organic matter of algae remains and sand grains (20% of the individuals) were found in gut content of *M. neglecta*. Diatoms recorded, belong, in general, to benthic forms and periphyton. Taxonomic composition of phytoplankton in the 50cm near bottom layer abd in gut content of *M. neglecta*, has a low level of similarity (0.16 by Sorensen). Thus, despite on a high concentration of near bottom phytoplankton, *M. neglecta* feeds as a deposit feeder in the Vistula lagoon. It is assumed that the choice of a feeding mode is determined by the ratio of food energy content of and energy demands on feeding, not by phytoplankton abundance.

In aboriginal areal, invasive clam *Rangia cuneata*, feed as a non selective suspension–feeder, consuming living and dead phytoplankton [Darnell, 1958; Olsen, 1976] or as a deposit feeder, receiving organic matter and phosphates from bacterial aggregates [Tenore et al., 1968]. According to these data, the contents of the *R.cuneata* gut, up to 70% were unidentifiable detritus, 10% of the sand grains, and 17% of macroalgae cells.

Comparison of the feeding character and food content of the invasive clam is done for the Vistula Lagoon and those in the native areal.

SPATIO-TEMPORAL DYNAMICS DISTRIBUTION OF MUSKRAT (*Ondatra zibethicus*) AND MINK (*NEOVISON VISON*) IN VERHOLENE AND R. LOWER TUNGUSKA

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Muskrat population of the Irkutsk region formed of 478 mammals, where 378 of them were taken from from the Solovetsky Islands, and 100 of them – from Finland (Komarov, 1970). According to (Bobrov et al., 2008) in 1936 in our area were expressed areas of muskrat habitat. They were found in Kachug near and around the mouth of river Nepa (a major left bank tributary of the river Lower Tunguska). In 1940, the vast majority of the most suitable water area was inhabited by these animals (Bobrov et al., 2008). According to this data we can suggest that the population process of the Irkutsk region of muskrat happened at the same period of time everywhere. Muskrat area in 1970 was stabilized and covered in the limits of region all suitable habitats for muskrats in all zones. After acclimatization blast population has stabilized at a relatively low level. In modern musk produced mainly as bait for a trap for sable hunting.

American mink by 1980 permanently inhabited by all the rivers of the northern macroslope of Eastern Sayan and Khamar Daban. In Verholene individual meetings have been reported during investigation process before hunting management projecting in 1970 on the western macroslope of Baikal ridge Mountains on the river Chanchur. As a resettlement of mink on the northern macroslope of Khamar Daban it is most likely due to its regular escapes from fur farms in the village Big River to river Angara. Cluster of mink habitat was formed in the north – in Zhigalovsky area along the river Basma – tributary of river Tilik (on the left bank of river Lena). Numbers in it was about 40 mammals (Leontiev, 1981). On the 28 km length route in January 1980 along the river Lower Tunguska down to the village Lower Karelino the author haven't found any traces of mink. On the Lower Tunguska River near the mouth of river Nepa this animal appeared in the 1990s. Mink settled on river Nepa in the 1980s, from its headwaters, from Ust Kut district. The extension of population process was gradual to the north along the river Lower Tunguska. In any case, around the area of villiage Yarema mink were reported in 2003, in the river Teteya (left bank tributary of the Lower Tunguska) this species appeared from river Bolshaya Yarema (also its left bank tributary) in the early 2000s. At present, according to the meeting of its tracks and preys, this animal inhabits all Lower Tunguska River with its tributaries in the Katanga district of Irkutsk region, which is wedged far north between the Krasnoyarsk Krai and Sakha Yakutia. Mink released for acclimatization in 1993 in Kazachinsko Lenskiy region (Naumov, 2003). By present in Verholene and by river Lower Tunguska mink widely spread north, settled the northern areas of the Irkutsk region and came out of its limits. Its population is relatively stable.

GROWTH CHARACTERISTICS OF INVASIVE SPECIES *CHAETOCEROS MINIMUS (LEVANDER) MARINO, GIUFFRÉ, MONTRESOR ET ZINGONE*

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In the spring 2006 registered new species of the Black Sea small cell diatom *Chaetoceros minimus (Levander) Marino, Giuffré, Montresor et Zingone.* This species developed (up to 4.5×10^4 cells / L) due to "bloom" coccolithophorid *Emiliania huxleyi* (over 1×10^6 cells / L). From 2007 to 2010, this species was not recorded in the field surveys. In late June 2011 in the coastal waters of *C. minimus* was registered again. In experiments with natural phytoplankton populations, taken June 24, 2011, there was a rapid development of algae. It is possible to determine the growth characteristics of invasive species in batch culture (Tab. 1).

Table 1. Estimates of biomass *Chaetoceros minimus* in the stationary phase of growth W_{max}, and the maximum specific growth rate μ_{max} and the degradation of D biomass in experiments carried out 06.24.2011 in batch culture

Parameter	Variants of experiment			
	1	2	3	4
W_{max} (mg/m^3)	18	25	40 – 45	18 – 25
μ_{max} (d^{1})	2.6	2.2	2.5 – 2.85	2.6
D (d^{1})	0 – 0.12	0.24 – 1.7	0.33	0 – 0.61

Note: 1 – elements of mineral nutrition were not added; 2 – nitrate (KNO_3, 12.1–14.3 mkmole / L); 3 – phosphate (Na_2HPO_4, 0.81 – 1 mkmole / L), 4 – both mineral nutrients.

To estimate the influence of nitrogen and phosphorus addition on the growth of invasive species have been calculated regression equation (in brackets the value of the confidence interval): Wmax (mg/m^3) = 26.85 – 3.4 N + 5.15 P – 7.11 NP (3.42)

From the equation, the maximum increase in biomass was achieved only with the addition of phosphorus. Increasing the concentration of only nitrogen or simultaneous addition of nitrogen and phosphorus led to a substantial increase in the proportion of this species in the community. The decomposition rate of biomass after the stationary phase of growth varied widely, from 0 to 1.7 day^{1} (with the addition of nitrogen). In the version with the addition of phosphorus degradation rate was 0.33 day^{1}.

From the results of experiments that the intensive development of *Chaetoceros minimus* occurs at relatively high concentrations of phosphorus and low levels of nitrogen. For any ratio of nitrogen to phosphorus species has a high rate of degradation after reaching the stationary phase of growth, especially with the addition of nitrogen (1.7 day^{1}), indicating that the instability of the species *Chaetoceros minimus* in culture. Based on the results, it is expected that the intensive development of the algae can be expected in the lagoons and bays with a high intake of phosphorus.

ALIEN BIRDS' SPECIES IN THE BIOSPHERE RESERVE "ASKANIA NOVA": BIOCENOTIC ASPECTS OF INVASION

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The wide ranging creation of forest ecosystem network in the steppes of the former Soviet Union lasting more than half a century is a unique model for cognition of mechanisms of alien species expansion of the global scale. The awareness and integrated assessment of the changes taken place in nature as a result of such an event were possible only in last years. However the majority of generalizations relative to regularities of biological invasions are based on more fresh empirical materials without using the data when "enrichment" of the steppes' fauna was considered only as a "positive" phenomenon. The birds were unusually representative in this issue. Despite mobility and significant pulsation (fluctation) of areas, their occupation of new artificial arboreal steppe ecosystem was unequal. This indicates a different "price" of environmental factors in the invasion process of bird communities.

Some adaptive reactions of population level as a basis of starting invasion mechanisms of alien bird species of the steppe south of Ukraine can be stated on the ornithological material:

– dynamics of an area of artificial forest belts and specific birds diversity in its have nonlinear dependence;
– elimination of artificial woody plantations is not characterized by "reverse" impoverishment of bird species composition;
– occupation speed of representatives of different faunogenetic groups is unequal.

The forest steppe birds occupied predominantly at the beginning of steppe afforestation, and in the final stage – nemoral:

–the widespread adaptation is a seasonal vertical change of tropical priorities within one biotope in the process of expansion of stenotopic forest species to a steppe;
– the following factors ordered by its influence on the formation of the structure of bird communities have the largest role in the present avifauna of the artificial woody plantations of the southern Ukraine. They are species of trees, humidity, age of trees and light structure.

CANADIAN APPLE MEALYBUG (PHENACOCCUS ACERIS) – IS THE AGGRESSIVE INVASION ALIENT INSECT SPECIES ON KAMCHATKA

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Phenacoccus aceris (Signoret) (Homoptera, Coccinea, Pseudococcidae) is distributed throughout the Palearctic and the Far East in Southern Primorye, Sakhalin, Kunashir Island; it hasn't been registered in Kamchatka by the recent time (Identifier of the Far East of the USSR, 1988, p. 700). According to the data of Kamchatka's Branch of Rosselhoztsentr, in 1992 the species was introduced in the vicinity of Yelizovo by vacationers with seedlings of red currants. Since 1996 the species became numerous and began to feed on almost all fruit and berries crops. Shrubs usually have little fruit, no gain, drying branches; in addition, the sweet excretion of *Phenacoccus aceris* are usually heavily inhabited by muchrooms *Capnopodium*, which suspend photosynthesis and make berries ineligible for eating.

By 2010, after years of failed fighting with this pest on almost all the lands of the Horticultural Nonprofit Partnerships (HNP) of Yelizovo district, about 50 80% of bushes of black and red currants, and 80% of gooseberry bushes had been cut down, many gardeners got rid of buckthorn, apples, felt cherries. Currently invader moved to the North of the peninsula and is registered almost on all the suburban areas of Yelizovo district, as well as in Milkovskiy, Bystrinsky and Ust Kamchatka districts (Milkovo, Anavgai, Esso, Kozyrevsk). From 2009 it has been registered in a critical quantity on *Crataegus chlorosarca* in Yelizovo city, as well as adjacent to the HNP forests. Mealybug defeat of Hawthorn in Yelizovo caused shrinkage of branches in 2009 up to 30%, in 2010 – up to 60%. The maximum size of the pest was in 2011 (400 600 cocoons per 1 dm^2 of the rind), in fall 60–80% of branches were decaying or having lack of fruiting. In spring 2012 10–30% of large branches were dried and 2 weeks delay of leafing for 30–50% of trees was registered; fruiting was very low.

Phenacoccus aceris feeds in individual cocoons on leaves, young shoots, and in abundance densely populate the branches and even the straight part of shafts. Life cycle of the species in Kamchatka: old larvae winter in cocoons on the bottom part of the shaft in the bark crevices and hollows; with the beginning of sap flow they start feeding; and in the end of April viviparous females appear. Since the early May, intensive resettlement of telotroch begins; from late May to mid June, after 2 or 3 molts, mature individuals appear. Females with egg sacs recorded from 20.06 to 15.07.2012. Telotroches of autumn generation registered from mid August to early September. Larval feeding continued until 18.10.2012, and since 25.10.2012 not feeding larvae either without wings (67%) or with the rudiments of the wings (32%) were found by us in cocoons. Fertility: up to 520 eggs in one egg sac.

Predators: in early spring larvae of *Hemerobius humulinus* L. (Neuroptera, Anthocoridae) actively feed on mealybug larvae (up to 8 individuals per 1 dm^2 of the bark), but with the appearance of aphids and caterpillars aphis lions switch to more affordable food. In summer mealybugs are eaten by larvae and beetles of two point Ladybird *Adalia bipunctata* L. (Coleoptera, Coccinellidae), larvae and adult bugs *Anthocoris nemorum* L. (Heteroptera, Anthocoridae). Parasites and diseases were not observed for mealybug. Mealybug colonies on sharks are eaten by nuthatches, chickadees, sparrows, small and big spotted woodpeckers. But as for the predators this food is not familiar because of the small size and complexity of obtaining from the cocoons, local predators can not regulate the number of mealybug. Only adverse weather conditions – cold winters and springs with periodic frosts – can significantly reduce its population size.

THE MORPHOLOGICAL CHARACTERISTIC OF NINE SPINED STICKLEBACK (*PUNGITIUS PUNGITIUS* LINNAEUS 1758) IN BASIN OF THE CHEBOKSARY RESERVOIR

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Analysis of our data and the literature allowed us to ascertain the expansion of the area nine spined stickleback *Pungitius pungitius* (L., 1758). Currently this is area covers the basin of the Middle and Upper Volga. In our opinion, the nine spined stickleback is undesirable colonizer. In connection with this morphological characteristics and intraspecific phenotypic variability of species *Pungitius pungitius* in the basin of the Cheboksary reservoir are of interest from the point of view of population ecology. *P. pungitius* was safely naturalized in Ushakovka river of the Nizhny Novgorod region. During 2011–12, the stickleback was greeting in the watercourses Sundir´ and Small Jung of the Republic of Mari El. We made measurements of 33 signs of a puberal and impuberal individuals for study the morphometry of stickleback.

In a result of research meristic characters we revealed that number of rays in the dorsal fin I D was 9–11, II D amounted to 8–12, in the anal A, respectively, 7–12, thoracic P 10–12. The number of stamens on the first gill arch is 10–12. The vertebrae of the trunk is 12–14 and the vertebrae of the fishtail is 18–21.

When we decide that the presence of sexual dimorphism in sticklebacks of the *P. pungitius,* material was chosen in order to eliminate the influence of age's variability. We investigated 21 and 25 individuals respectively for the identification of possible morphological differences on the complex of characters (30) between the males and females of stickleback. We used the non-parametric discriminant analysis (module GDA Statistica 6.1) because not all the characters were subordinated to the normal distribution. We used statistical criteria: Wilkes and F test of significance; the squares of the distances Mahalonobisa; the standardized measure of parameter (beta), the level of significance. Analysis of gender differences of the two ages (0+ – 1+ and 2+ – 3+) of *P. pungitius* with the help of criterion Wilkes revealed no statistically significant differences between males and females. Sexual dimorphism was not found, therefore for the further analysis, we can use the combined sample spined stickleback. We identifed the age dimensional variability *P. pungitius* allocated groups of fish on length and age. This is gave us the opportunity to trace the change of merestic and qualitative characteristics with the age and the length of the body. Of qualitative characteristics of changes postdorsal distance. In the individuals of the 23–49 mm CV, %=53.2; the fish 49–60 mm CV, %=35.3. It is known, that all is considered to be uniform, if a CV, % not more than 33% for distributions, close to normal. CV%, as the indicator of variability of attributes of an opportunity for the analysis of the situation, when the transition from one environment to the other causes sharp adjustment phenotype. This is case we are witnessing the phenotypic variability of the species. So, besides postdorsal distance of a number of signs, the variation of which are closely linked with the external conditions of the habitat, as well undergone changes. The length of the tail between the two age groups of stickleback varies approximately in 3 orders. The length of the tail's fin, the greatest width of the body, width of head varies approximately in 2 orders accordingly. This fact may indicate the adaptive nature of the observed changes.

So, the morphological (phenotypic) the variability of *P. pungitius* in the basin of the Cheboksary reservoir has an adaptive character. On the contrary sexual dimorphism *P. pungitius* as merestic, and so on qualitative characteristics is not pronounced.

ALIEN FISH SPECIES IN THE ILI RIVER WATERSHED

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The Ili River is the biggest inflow of the Balkhash Lake. About 30 fish species had been introduced there from the end of the XIX th to the end of the XX century. Some researchers supposed Siberian dace *Leuciscus baicalensis* like indigenous, but others contrariwise like alien one. There were not reliable descriptions of the Chinese sleeper *Percottus glenii*. Only species from the ciscos family could not to naturalize in the Balkhash Lake watershed. Common carp *Cyprinus carpio*, Prussian carp *Carassius gibelio*, roach *Rutilus rutilus*, grass carp *Ctenopharyngodon idella*, asp *Aspius aspius*, bream *Abramis brama*, silver carp *Hypophthamichthys molitrix*, wels *Silurus glanis*, sander *Sander lucioperca*, Volga sander *Sander vogensis* became commercially important and so state of their populations was attended. And 5 species like Chinese false gudgeon *Abbottina rivularis*, topmouth gudgeon *Pseudorasbora parva*, sharpbelly *Hemiculter leucisculus, beautiful sleeper Hypseleotris cintus and Amur goby Rhinogobius cheni* were numerous too, but considered like dirt fishes. Therefore we explored alien fish species with lack of data during 2000–2012 years.

No one of mosquitofish *Gambusia holbrookii* and bigmouth buffalo *Ictiobus cyprinellus* had been found. Aral barb *Barbus brachycephalus* remained rarely fish. We found only remains (head and fins) of Aral barb in 2004 and 2012 in garbage leaved by fisherman. Both times it was quite big fishes with body length 50 cm at least.

Tench *Tinca tinca* is not wide diffused invader. This species was found in a small isolated lake near to Zharkent town only. Biological characters of fishes indicated to the favorable state.

Ricefish was wide diffused in the river as well as it different inflows. Complex of morphological features shown that ricefish in the Ili river bellows to the species *Orizias sinensis* Chen, Uwa et Chu, 1989, but not to the Japanese ricefish *Oryzias latipes* Temminck et Schlegel, 1846.

Snakehead *Channa argus* rapidly expanded there. This species reached the delta from middle part of the river during 12 years and now became usual in commercial catchments. Bitterling *Rhodeus sericeus* settled in he Ili River from boundary with PRC to delta during 20 years. The loach *Misgurnus mohoity* (Dybowski, 1986) continue to inhabit in the top site of the river.

Three sites with different fish composition could be distinguished in the Kazakhstan part of the river: from boundary with PRC to the Kapshagay water reservoir, the Kapshagay water reservoir, and from Kapshagay water reservoir to the mouth of the river.

Very unstable water regimen as well as strong poaching could be principal causes of relative low diversity and abundance of fish fauna in the top part of the Ili River. Occasional recent findings of indigenous fish species that were not observed in the river during last 2–3 decades pointed to significant changes in the fish communities and abatement of press of alien fishes.

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ASSESSMENT OF STATUS OF INDIGENOUS AND INVASION SPECIES OF BIVALVE CLAMS IN RELATION TO SALINITY AT BASE OF OSMOTIC AND IONIC REGULATION PATTERNS

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Salinity and ionic composition of the natural waters are the main limiting factors of hydrobiont's dispersal, including an introduction into a new habitat. Range expansion occurs in different directions, both within marine or freshwater ecosystems, and when river sea barriers are crossed. In some seas with salinity below the ocean level, as the Black, Azov, Caspian and Baltic, there are large areas of low salinity, where organisms of freshwater, marine and euryhaline origin are dwelling together. It is important to clearly define their status in relation of salinity, because on frequent role of such brackish marine areas as a source of invaders, including invasive species, harmful for recipient ecosystems. The status of hydrobionts in regard of salinity is usually estimated from ecological characteristics as mode of life.

Euryhaline status is often assigned only to the consideration that the original population live in the sea and disperse in freshwater direction. For example, it was thought that sprat *Clupeonella cultriventris* Normann and tsutsik goby *Proterorhinus marmoratus* Pallas, the aboriginal inhabitants of the Caspian, Azov, Black Seas and its estuaries belong to euryhaline species. We have shown, these species have only freshwater patterns of osmotic and ionic regulation, defining its dispersal in fresh and brackish waterbodies. This knowledge let to predict further range expansion of these species.

Dreissenid clams are successfully disperse out of the Ponto Caspian basin through the riverin systems northward to the Baltic Sea as well as in North America. On the other hand, some bivalve species (*Mya arenaria*, *Rangia cuneata*) entered the brackish waters of the Baltic Sea where were successfully naturalized, across the Atlantic ocean (by shipping). If *M. arenaria* for centuries, apparently, mainly realized its dispersal potential in the Eastern Hemisphere, the only local population in the Baltic Sea (the Vistula Lagoon) of the new American invader – common rangia, will be a source of secondary dispersion of the invader in the Baltic and other European seas. Taking into account that *R. cuneata* is a warm water species, its further successful establishing in the southern seas of Eurasia is even much probable.

The observed climate trends, as it is predicted by the different global and regional climate models scenarios, will affect the salinity regime, especially in marine coastal and estuarine areas. This makes it urgent to predict change of range of dispersal not only of the recent invaders, but also long ago naturalized and native mollusk species.

To assess the invasive ability of invaders, and to predict possible range expansion of mollusks species living in brackish waters of the Baltic Sea in a changing climate, the knowledge on osmotic and ionic regulation patterns is necessary.

The report presents the results of defining of osmotic and ionic regulation patterns for different bivalve species. At base of data gained, dispersal abilities in freshwater and brackish environment are estimated.

BIOTIC INVASIONS SPECIES AS PROBLEM OF ECOLOGICAL AND ECONOMIC INTERACTIONS

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The invasion of alien species in agroecosystems causes environmental costs. Environmental costs of invasions (**ECI**) is defined as the sum of costs fitoquarantine (**QC**) and economic costs of invasions (**EcCI**): **EnCI = QC + EcCI.**

EcCI is calculated as a physical unit (volume, kg, m², etc.) and cost both monetary value of the negative impact of environmental violations agroecosystems.In today's economy criterion of profitability is to get the maximum profit per unit of investment. Given the risk of danger of invasion of an alien species in quarantine agroecosystems can lower the level of profitability.Assess the risk of economic losses from invasive possibly considering four main parameters of the process:

1. Probability species invasion, **In**.
2. Probability of occupation a large area, **Oc** (assessment of potential area injurious species).
3. The vulnerability of the crop of the recipient under the influence phytopathogen (level of damage, and particularly the relationship host plant parasitic phytophagous), **Hr.**
4. The carrying amount of crop of the recipient, ie, expected revenue from the sale of the vegetable products harvested without invasion, **BL**.

Thus, the damage, the risk of loss is estimated as follows: **R EnCI** = **In x Oc x Hr x BL**.

In case the reduction of yield on the factor of the invasion, it is necessary to pay attention to the controlling factor the vulnerability of the recipient **Hr**.

For example, reduce the vulnerability of the crop of the recipient Hr, can the use of resistant varieties of crops to certain phytopathogens. This will increase the yield of agricultural crops, subject to invasion factors.

Development of methodology and methods of risk assessment of losses from biotic invasions in the agricultural sector in the language of "profitable / gainless", you can go to environmental insurance losses from the random, natural process, triggered by human activity.

ECOLOGICAL AND BIOGEOGRAPHICAL ASPECTS OF INVASION POLYCHAETES *MARENZELLERIA ARCTIA* TO THE BALTIC SEA

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During last decades fauna of the Baltic Sea was essentially transformed by invasion processes. In macrozoobenthos the most significant changes were connected with introduction of polychaetes of the genus *Marenzelleria*. The first wave of invasion in 1980s and 1990s, caused by North American species *Marenzelleria neglecta* and *Marenzelleria viridis*, affected mainly shallow areas, especially in the south part of the Baltic Sea. In the Northern Baltic mass development of polychaetes was recorded in middle 2000s and was connected with establishment of arctic representative of the genus – *Marenzelleria arctia*. Polychaetes invasion resulted in radical changes in the bottom communities, as well as, on the ecosystem level. The biomass of benthos increased. This increase was especially evident in hypoxic areas since *M. arctia* is resistant to oxygen deficiency and able to colonize quickly vacant bottoms unsuitable for existence of other animals. *Marenzelleria* spp. dig the bottom deeper noticeably than native inhabitants of the Baltic Sea. Bioturbation and bioirrigation activity of *Marenzelleria* spp. promotes oxygen penetration into sediments and formation of powerful oxidized layer, increasing the phosphorus retention in bottom sediments. Apparently, it is one of the main reasons of the ecological situation improvement because of decline of cyanobacteria blooms and mitigation of eutrophication that observed in some Baltic areas after introduction of polychaetes. Biological invasions are generally considered the threat to the natural ecosystems. The positive aspects of polychaetes *Marenzelleria* spp. invasion distinguish they favorably in comparison with other alien species, which introduction are accompanied, as a rule, by negative consequences. The possible explanation is connected with history of the Baltic fauna formation. *M. arctia* is representative of estuarine arctic faunistic complex inhabiting mouth areas of large northern rivers. During the post glacial period the Baltic Sea, as well as some inland water bodies, were colonized by the crustacean species of this complex (so called glacial relicts – *Monoporeia affinis* and *Saduria entomon*), which dominated up to recent time in the benthos of the Northern Baltic. The more stenohaline polychaetes could not adapt to environment of freshwater lake, forming in the basin of the present day Baltic Sea after ice melting. Thus, *M. arctia* invasion can be considered as a logical completion of post glacial expansion of arctic brackish water fauna into the Baltic Sea. From ecological point of view it is, in fact, restoration of natural community destroyed during Ice Age that favorably affects the other components of ecosystem, specifically pelagic communities. In the last years abundance of glacial relict species in the Baltic Sea declined steadily. The deterioration of deep waters oxygen regime played significant role in this process. Owing to invasion of hypoxic tolerant polychaetes *M. arctia*, bottom fauna of open areas of the Baltic Sea become arctic again. As a practical matter, interestingly that it is seldom (if not unique) case of southward migration of arctic species. Arctic fauna is usually considered as non expansive. However it is possible that low number of arctic invaders is not explained by only biological characteristics of arctic fauna, but by low up to recent time level of shipping in Polar Regions too. The current increase of human activity in Arctic can give a chance for southward expansion of many species.

NEW SPECIES INVASION INTO THE ARCTIC OCEAN PELAGIC ECOSYSTEM IN FRAME OF RECENT CLIMATE CHANGE

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Recent warming in the Arctic is reflected, first of all, on the sea ice cover of the Arctic Ocean that is well documented in decreasing of thickness and ice extent, warming and freshening of surface water, increasing of ice open water surface, as well the changes in ice and water circulation. During the last decade, the changes in the physical environment are well established. How do the sea biota react on these changes? At the end of 90th of the last century, the invasion of the pacific water copepods *Calanus marschallae, Eucalanus bungii, Metridia pacifica, Lucicutia ovaliformis* and *Heterorhabdus pacificus*, as well hydromeduse *Atolla tenera* and *Pantachagon haeckeli* and amphipod *Scina pusilla* into deep sea water Arctic Ocean were documented (Melnikov, Kolosova, 2000). In previous observations these animals were unknown in plankton of this region. Except of new invased expatriat species (the Johnson 1963' expression), recently, in the arctic sea ice cover is well detected remarcable quality quantity reconstruction in the sea ice species composition. This variation is determined, in general, by decreasing in domination of multy year ice and increasing role of seasonal ice those function are remarcable defferent (Melnikov, 2008). On the fact of observations for the species composition of the sea ice biota during the Panarctic ice camp expedition in the 2007–2011 period, the changes of dominant species in both floristic and faunistic communities were detected, the reasons of thoses will be discussed during the presentation.

CYCLIC INFESTATIONS OF ALIEN SPECIES IN EASTERN SIBERIA AS REFLECTANCE OF THE GENERAL PROCESSES OF THE CLIMATE DYNAMICS OF CENTURY LEVEL (ON THE EXAMPLE OF BIRDS)

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In terrain of Eastern Siberia in the end of XX century the climatic cycle of century level terminated (Mel'nikov, 2009). It proves to be true also special analytical works klimatologyers that region (Janter, 1993; Obyazov, 1999, 2012). As it is known, climatic cycles of all levels come to an end with the heat dry phase accompanied by appreciable changes in level of the supplying with water of extensive terrains. In the end of century cycles many large Lake systems considerably decrease in dimensions, and more shallow one completely dry up (Shnitnikov, 1957; Mel'nikov, 1988, 1998, 2001; Maximov, 1989; Krivenko, 1991; Obyazov, 1999, 2007, 2012; Tkachenko, Obyazov, 2003).

The beginning of a heat dry phase of century level, as a rule, coincides with augmentation of quantity and the area of severe droughts (Koshelenko, 1983; Mel'nikov, 1998, 2004; Levi et al., 2003, 2004). According to it, in the fifties XX centuries in the Central Asia (Mongolia and China) has sharply increased frequency of repetition and extensiveness of extreme droughts on force (in 1972 all Mongolia) (Koshelenko, 1983). In severe droughts (the end 50 – the beginning of 60th years of the last century) the accurate tendency to augmentation of number of many ordinary species was outlined in southern regions of Eastern Siberia shorebirds both a waterfowl. Sharp growth of number of the new species which earlier were not marked in that terrain, or meeting only individual individuals and small bunches or shoals is noted also (Izmaylov, 1967; Lipin et al., 1968; Izmaylov, Borovitskaya, 1973; Tolchin et al., 1977; Mel'nikov, 1986, 2009; Durnev et al., 1996).

The further warming of a climate, in places on the average on 2.2ºC for 59 years (Obyazov, 2012), has caused augmentation of number and areas of many species of birds in the north of that region. Some of them have reached the Central Yakut lowland, having generated here the large breeding grounds (Mel'nikov, 2009). Changes and in density of nesting of many species of birds of Southern Siberia are noted. Their considerable part was displaced on a breeding site in northern widths (on 300–500 km) though the southern border of areas remained without change. The developmental character and movings of large droughts to arid areas defined regional specificity of features of formation of structure and dynamics of the population of birds of Siberia. As a result of strong crossing all migratory ways of region, the same species in the different seasons of the last century periodically appeared on the same areas from different directions. It promoted strong hashing in Siberia birds of different populations of the same species.

The termination of droughts was accompanied by recapture of birds in initial areas. However in the north of region extensive areas of nonresistant nesting of new species were generated. There were large scale changes of the general contour of their areas, shift of regions of an ecological optimum and there were new breeding grounds. The further destiny installers, undoubtedly, will be defined by the general climatic trends in extensive terrains, first of all, the Central Asia. Such changes of areas have cyclic character, were repeatedly observed in present period (Løvenskiold, 1964) and bound to climatic cycles of century and centuries old levels. Important that evictions of birds of many species have character of mass infestations and are accompanied by sharp changes of northern borders of areas. Consequences of such evictions for economic activities of the person to predict very as well as to estimate a role of new species in the generated ecosystems as long observation are for this purpose demanded. Undoubtedly, to affect such large scale processes mankind not in a state and it demands their very careful studying.

ADVENTIZATION OF NATURAL ECOSYSTEM OF THE NYZHNYI BYG DNIPRO LOWLAND AREA (UKRAINE)

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Adhering to strategy of preservation of biological diversity it is necessary to supervise its condition in natural, agricultural and urban ecosystems. Distribution of alien plants is one of the reasons of decrease in biological diversity of natural ecosystems. That why now alien plants are studied as a component of a particular ecosystem or a particular plant community, and their mutual influence.

The territory of Nyzhnyi Bug–Dnepro lowland area is situated in the south of Ukraine in the northern Black Sea coast. It unites the unique natural ecosystems. These ecosystems were founded by the mutual influence of the sea, river and steppe structures. They include psamophytic, petrophytic, saline, marsh and water vegetation.

The alien plants, which invade and settle in natural and semi natural communities of the study area are presented by 85 species of higher vascular plants with 62 genera and 40 families. Ten of them belong to the "type of transformer." Plants of this category are the dominants and edificators which form single species community, prevent the resumption of aboriginal species and force out them (*Ambrosia artemisiifolia* L., *Amorpha fruticosa* L., *Anisantha tectorum* (L.) Nevski, *Conyza canadensis* (L.) Cronq., *Centaurea diffusa* Lam., *Iva xanthiifolia* Nutt., *Grindelia squarrosa* (Pursh.) Dunal., *Elaeagnus angustifolia* L., *Xanthium albinum* (Widder.) H. Scholz., *X. pensilvanicum* Wallr.).

Plant communities of the following classes of natural vegetation in the study territory are most vulnerable to plant alien: *Festucetea vaginatae* Soo 1968 em.Vicherek 1972, *Molinio Arrhenatheretea* R.Tx. 1937, *Festuco Brometea* Br. Bl. 1949 and others.

The psamophytic vegetation is subject to penetration *Artemisia absinthium* L. This species is very active in the natural communities of class *Festuco Brometea*. In natural ecosystems meets on the coastal spits and ridges. *Elaeagnus angustifolia* is one more species which takes root into psamophytic steppes. This species forms association *Elaeagnetum angustifoliae* Chinkina 2002. Under the canopy the conditions are better for alien nitrogen loving weedy species, which replace local taxa (for example, species of genera *Anacamptis* L.) *Amorpha fruticosa* is a nitrogen donor and is the largest consumer of the light and the active coenoform. The spreading of this species leads to structural and functional changes of coastal ecosystems. In places of spreading *A. Fruticosa,* the individual of rare species disappear. *Alyssum savranicum* Andrz., *Anacamptis palustris* (Jacq.) R.M. Bateman and *Stipa borysthenica* Klokov ex Procudin. *Conyza canadensis* occupies coastal sands (coastal and alluvial). Also, this species is a natural element of petrophytic communities. The widest ecological amplitude (habitat range) of study area is registered for *Centaurea diffusa.* It penetrates into plant communities belonging to steppe, psammophytic and petrophytic) *C. diffusa* "genetic pollutant". It forms hybrids endemic species Nyzhnyi Byg sands *Centaurea margarita alba* Klokov. In community petrophytic vegetation penetrates more *Grindelia squarrosa.* With the absence of the animals, which eat *G. squarrosa,* it dues to mass spreading.

Alien species of plants are registeredin all natural ecosystem of the Nyzhnyi Byg Dnipro lowland area. Most of them do not show clear coenocytic preferences. For preservation of stability and resistance of natural ecosystems to phytoinvasions to the need to develop the classification of plant communities based invasibility. Also to give an assessment of stability of native vegetable communities in the conditions of a coenocytic press from alien species.

HOUSE CENTIPEDE *SCUTIGERA COLEOPTRATA* IN UKRAINE: A RARE SPECIES BECOMES AN ORDINARY SYNANTHROPIC ONE

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House centipede *Scutigera coleoptrata* Linnaeus (1758) (Chilopoda, Scutigeromorpha) inhabits Southern and Central Europe, Caucasus and Northern Africa. In Ukraine it was the rare species of southern and south western Crimea coast till recently. There it lived in rock clefts, under stones, in old buildings and in buildings of abandoned villages. Its population decreases there because of recreational pressure on the natural habitats. This species is listed in the Red book of Ukraine [Черный, 1994; Таращук, 2009].

The active resettlement of this species on the Ukrainian territory has been observed in the last two decades. We have data about meetings of *S. coleoptrata* in Odessa, Kherson, Donetsk, Yahnyki village (Poltava region), Novomoskovsk (Dnepropetrovsk region) and Dnepropetrovsk, Kharkov, Kiev, Sumy and Sumy region. It was met in 13 settlements of Sumy region, and in Sumy we noted it in 36 locations [Мерзликин, 2006; Мерзликин, Шевердюкова, 2009]. It was also found in all districts of Krivoy Rog region [Коцюруба, 2012], 7 districs of Lugansk region and Lugansk [Загороднюк, 2012; Шепітько, 2012], in the Carpathian Mountains (Uzhgorod) [Chumak, 2010]. *S. coleoptrata* becomes an ordinary synanthropic species from a rare one. In most cases people kill meeting House centipedes. All its meetings happened in different buildings. Among the 54 findings in the Lugansk region 52 were in buildings and only 2 – in natural habitats [Шепітько, 2012]. *S. coleoptrata* were met in the various buildings: in one storey private houses, in backrooms, in multistorey buildings (dwelling houses and establishments), in boilers and sewerages.

S. coleoptrata move in multistorey buildings through a ventilation. They come in private houses get through the opened habitats. They are met in buildings during a year. Their reproduction also occurs during the whole year.

FINDS OF THE RED-EARED SLIDER *TRACHEMYS SCRIPTA ELEGANS* (REPTILIA, TESTUDINES) IN THE NATURAL BIOTOPES OF UKRAINE

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Red-eared slider *Trachemys scripta elegans* Schoepff, 1792 is the inhabitant of reservoirs of the east of USA and the northeast of Mexico [Банников, Дроздов, 1985].

The mass export of these tortoises resulted in the red-eared slider actively naturalized in wild nature in many countries of the world in the last decennary and turned out an aquarium species to the member of local herpetofauna. The Group on the invasive alien species of the International union on the guard of wild nature added the *T. scripta elegans* to the first hundred in the list of invasive dangerous plants and animals [100 of the World's Worst Invasive Alien Species]. A total trade ban of this species is in European Union. Red-eared sliders already inhabit natural biotopes in about 30 countries [Pendelburu, 2007]. They were repeatedly met in the ponds of Moscow [Семенов, 2009]. Ukraine is not an exception, this species was met here in natural ponds.

So, at first I fond a red-eared slider on the 10.07 2005 on the Chekha lake's bank in Sumy [Мерзликин, 2012]. The new findings of this species are resulted in further observations.

One red-eared slider was seen on the 15.06 2009 and 15.09 2012 in the small river in Sumy. In September, 2012 one adult individual was seen in the park pond in Sumy repeatedly. On the17.08 2012 adult red-eared slider was met on the river Psel approximately in 10 km below Sumy (near Red village, Sumy district).

Also, *T. scripta elegans* was met in other cities of Ukraine. In July, 2003 one individual was constantly observed on the channel bank in Verkhnedneprovsk (Dnepropetrovsk district).

In summer 2012 there were two meetings of adult *T. scripta elegans* in different ponds in Donetsk, and in winter one tortoise was caught on a hook on under ice fishing in a suburban pond [Загороднюк, 2012]. There is information about releasing of these tortoises in Lugansk [Загороднюк, 2012].

As a result of the above facts, the most meetings of *T. scripta elegans* take place in cities ponds. There is the danger of stable populations' existence in natural habitats, while it is impossible to talk about.

ROLE OF COLD HARDINESS IN INVASION RESTRICTION OF INVERTEBRATES IN THE NORTH EAST OF ASIA

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The North East of Asia is a model territory for studying of invertebrate invasions into the regions with the extreme harsh climate. Active settlement of the Magadan region started since 20 ies of the last centuries; and in nature one species of worms (*Eisenia nordenskioldi nordenskioldi*) and one species of slugs (*Deroceras laeve*) live here. On the sea coast, where climate is milder comparing to continental areas with monsoon climate, four ecdemic species of earth worms (*Dendrobaena octaedra*, *Dendrodrilus rubidus tenuis*, *Eisenia nordenskioldi pallida*, *E. fetida*) and three species of slugs *(Deroceras altaicum*, *D. reticulatum*, *D. agreste*) got acclimatized. All of them are high in number here, but inhabit a restricted range of biotopes. In natural habitats of continental areas the ecdemic species were not found, but even in anthropogenic conditions they are absent or rare in number.

Probably, at the background of such distribution of the mentioned species, a lack of cold hardiness to low temperatures of continental areas lies. Worms *D. octaedra* and *E. nordenskioldi pallida* tolerate to 14 and 28ºC correspondingly, slugs *D. agreste*, to 10ºC. Postembryonal stages of the other species do not survive negative temperatures. Embryonal stages can be cooled to 15… 17ºC (*Deroceras altaicum*), 23ºC (*E. nordenskioldi pallida*), 25ºC (*D. agreste*), 35ºC (*D. reticulatum*), 40°C (*Dendrobaena octaedra*) and 196ºC (*Dendrodrilus rubidus tenuis*). *E. fetida* is not tolerant to negative temperatures at any stage of onthogenesis.

Ecological meaning of the obtained values of cold hardiness can be understood by comparison of its characteristics with the temperature conditions in the soil at a depth of 3–5 cm, where ecdemics overwinter. On continental part minimum soil temperatures at that depth were 19… 23ºC. On the coastal landscapes of the Sea of Okhotsk soil temperatures do not decrease 13… 15ºC. In these conditions only embryonic stage of all species and, besides, the worms *D. octaedra* and *E. nordenskioldi pallida* can overwinter. *E. fetida* occurs only in not frozen through in winter soils of anthropogenic locations.

At insufficient cold hardiness of postembryonic stages invertebrates can survive only in conditions allowing completion of ontogenesis “from egg to egg” for one season. This is impossible in continental areas, where frostless season lasts not more than 2.5 months, while complete cycle of development of invading species takes from 4 to 6 months.

Consequently, cold hardiness limits invasion of the mentioned species to the North East, except for *E. nordenskioldi pallida. E. fetida* is limited in the hardest way, since it passes to obligatory sinanthropy even in coastal conditions. Absence of *E. nordenskioldi pallida* in permafrost zone is apparently determined not by temperature factors of environment, but by inapplicability for feeding of organic matter by organic mineral horizons of permafrost soils.

Thus, most of the earthworms and slugs colonizing the North East of Asia do not penetrate further than climatic milder coast of the Sea of Okhotsk. Reasons hampering this process are the same in both groups – one part of the worms and slugs has insufficient cold hardiness for wintering in continental areas, while the other part, probably, has not enough time to complete the cycle for one season. Preadaptive potential of the invasive species under discussion is insufficient for colonization of the North East of Asia.

ALIEN SPECIES IN EASTERN EUROPE AQUACULTURE

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New aquaculture objects often appear as a result of intentional movements from other countries and regions fish species with attractive technological, gastronomic, commercial advantages: euribiont properties (Haarder *Liza haematocheila*), first order consumers (herbivorous fishes), high growth speed (Siberian sturgeon *Acipenser baerii*), delicacy quality and high cost of productions (Acipenseridae, rainbow trout *Parasalmo* (= *Oncorhynchus*) *mikyss*, tilapia *Oreochromis* genus, king crab *Paralithodes camtschaticus*). They are both in traditional aquaculture alien objects, and in again appearing ones, as Tunas *Thunnus* genus.

Despite the fact that the alien species in aquaculture of Eastern Europe countries (Germany, Czech Republic, Slovakia, Hungary, Poland, Lithuania, Bosnia and Herzegovina, Slovenia, Bulgaria, Romania, Moldova, Russia, Ukraine, Belarus) is a source of biological threats to aquatic ecosystems, fish and human communities, they are the subject of a profitable business, and account about 65% of the total value of European aquaculture production. This determines the continued search for new facilities invasive species and their widespread adoption in commercial fish farming. In the last decade, aquaculture diversification increases, so that the movement of a species for breeding and cultivation not only between countries but continents, i.e. directed invasion continues (FAO World Fisheries and Aquaculture State, 2010, 2012). This process is typical for Russian aquaculture too.

Historically, European aquaculture has used native fish species, but it is not necessarily true: Atlantic salmon *Salmo salar* is aborigine in Norway, but it is alien species in Greece. On geographical sources the invasive facilitiers in European aquaculture can be divided into 4 types: intracontinental, American, African, Asian (Bogeruk, Lukanova, 2010). Examples of intracontinental alien fish species in Eastern Europe can serve the Adriatic sturgeon *A. naccarii*, Siberian sturgeon and Sakhalin sturgeon *A. mikadoi*, American ones are Paddlefish *Polyodon spatula*, Baltic sturgeon *A. oxirhynchus oxirhynchus*, Brook trout *Salvelinus fontinalis*, Black bullhead *Ameiurus melas*, Largemouth black bass *Micropterus salmoides*, Channel catfish *Ictalurus punctatus*, Red croaker *Sciaenops ocellatus*, African catfish *Clarias gariepinus*, to Asian sources belong the herbivorous fishes Silver carp *Hypophthalmichthys molitrix*, Bighead carp *H. nobilis*, Grass carp *Ctenopharyngodon idella*, and Black carp *Mylopharyngodon piceus*.

Recently in fish farms, equipped with a system of closed circuit water supply, a new invasive object – barramundi *Lates calcarifer* (Hungary, Bulgaria, Russia) (Kucska et al., 2010), was appeared. It was imported from Australia, and it means the emergence of yet new source of invasive species in the East European aquaculture – Australian. With the increase in the number of aquaculture invasive objects the risks in the areas of biosecurity, ecology, commerce, and society are increased. An integrated approach to management in Eastern Europe for sustainable aquaculture development is necessary. The minimization of risks in Russia resumption expertise can contribute to projects of introduction of new alien species in aquaculture, as previously occurred in the defunct Interdepartmental Ichthyology Commission.

THE COLD ROUTE: ALIEN BIOTA SPREAD VIA ARCTIC SEAS

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Many exchanges of aliens have taken place between northern oceans arising from stocking and culture activities. This has enabled some NW Pacific species, and their associates, to successfully colonise North Atlantic waters. Few aliens are known to have spread between these regions by vessels because of a persistent surface ice barrier and their physiological intolerance when carried through tropical seas. This situation is likely to change with access to new cold water trading routes and exploitation of resources in Arctic seas as ice seasonally recedes. This may allow incremental and long distance spread to the ranges of some species with access to either northern ocean during this century. In this account we present scenarios that are likely to result from this sea ice depletion. The pathways and the vectors likely to extend the range of particular taxa are considered. These range from natural extensions, discards by fishing vessels, spread with ballast water or biofouling of ocean platforms, leisure craft and commercial vessels as well as by aquaculture and stocking. This new commercial shipping route may result in new species introductions as the previous invasion barriers, i.e. long voyage duration and tropical passage of vessels, will be overcome. It is further expected that new big hub ports will be established which may receive large amounts of ballast water thereby increasing the risk of species introductions.

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NATURALIZATION OF CHANNEL CATFISH (ICTALURUS PUNCTATUS) IN THE WESTERN PART OF THE STAVROPOL TERRITORY

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Studies conducted in 2006 (Mishvelov, Oleynikov, 2007), showed the presence of channel catfish for the middle and upper reaches of B.Egorlyk river, and a number of water bodies concomitant an artificial hydrographic network (reservoirs and channels).

Studies continued in 2007–2012 not only confirmed the presence of this species for the investigated area, but also allowed to hypothesize that naturalization was held.

Thus, the occurrence of channel catfish (average body weight 461.6 ± 6.4 g) in the structure of the fish population in the middle reaches of B. Egorlyk river nearby with village Bezopasnoe (2007) (the impact zone of the Stavropol GRES) was 35% (chub – 39%, kuban barbel – 12%), which can be attributed the channel catfish to the mass kind for the surveyed area.

In the catches of this year also attended the instances of studied speciesmass with mass 5.9 g, and more than 20 g. It should be noted that in the specialized fish farms in studied areas the artificial reproduction of catfish is not conducted.

In the group of old ages fish from one catches in 2007 the studied area was found sexually mature female (absolute body length – 41.2 cm, weight – 800 g). Female's gonadosomatic index was 16%, maturity stage – IV, and weight of 100 eggs – 1.184 g, ie one berry weight was 11.8 mg. Data from surveys of local amateur fishermen also confirm that while catching of channel catfish was found sexually mature females with eggs.

In the samples from July to August 2007 at a temperature of 26–28ºC registered specimen with body weight less than 30 mg (minimum – 20 mg), which is comparable with the literature data about the mass of larvae of channel catfish at hatching – 11 mg (Moskul, 1998) indirectly confirms the probability of passage recent spawning, supposedly in the river. Such early years were studied species fixed in the subsequent period 2008–2012 samples. for the the middle reaches of B. Egorlyk river.

In early September a significant part of reached a weight of around 2 g or more. In the upper B. Egorlyk river (GRES effect of warm water is not available) young did not show up, but sometimes catches recorded old age specimen of channel catfish. Confirmed the presence the fish of different ages of this type in the structure of the fish population in river Kuban and its inflows near with Nevinnomyssk area (impact zone Nevinnomyssk GRES).

Thus, supports the hypothesis naturalization of channel catfish in water bodies and hydrographic network of B.Egorlyk river and Kuban river in the western part of the Stavropol Region, exposed to the warm waters of the waste thermal energy facilities, according to the data of the structure in fish populations, species distribution and occurrence in recent decades, the presence sexually mature female, young fish and its growth.

The issues of the consequences about naturalization species, including its impact on indigenous communities require further investigation.

ENDEMISM, RELICTS AND INVASION SPICES OF ANIMALS IN STRUCTURE OF THE BIODIVERSITY OF THE CENTRAL CISCAUCASIA

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At the present stage scientists the North Caucasian Federal University actively conduct work on studying of fauna of the Central Ciscaucasia (A.N. Crest, A.A. Lihovid, S.I. Sigida, E.G. Mishvelov, B.K. Kotti, A.I. Goncharov, M.P. Iljuh, S.V. Pushkin, E.G. Chenikalova, V.H. He, L.V. Malovichko, V.P. Tolokonnikov, L.M. Trofimova, V.A. Minoransky, A.I. Lihovid, O.P. Negrobov, M.F. Tertyshchnikov, L.P. Yermolin, M.S. Dementyev, I.M. Manuylov) (Mishvelov, 2005).

To the beginning of XXI century dwelling in territory of Stavropol Territory about 525 spices of vertebrate animals (classes is known: fishes, amphibious, reptiles, birds, mammal) (Manuylov, etc., 2001; Sent Iler, 1937). Invartebrata animals prevail over vertebrata, on preliminary data their number reaches an order of 37 thousand spices.

Uniqueness of a biodiversity of the Central Ciscaucasia is connected with presence endemics, relicts and invasions spices (about 3% from the general number of native spices). Unfortunately, dynamics of number of spices of first two categories is connected with reduction (The Red book …, 2002) whereas for invasion spices the XX th century is characterised by sharp increase in number, for example, for Leptinotarsa beetles (Kovalev, 1981), the American white butterfly, a grape snail, an annulate turtle dove, channel сомика, muskrats, etc.

The aggregate number invasion spices of animals of the Central Ciscaucasia on preliminary data reaches 57 (tab. 1).

Table 1. Role invasion spices in a biodiversity of the Central Ciscaucasia

Type	Class	Number of spicrs	
		The native	invasions
Artropods	Crustacea	120	7
	Insects	35000	16
Molluscs	Bivalvia	10	2
	Gastropods	90	1
Chordata	Bone fishes	80	31
	of the Bird	322	2
	Mammals	86	3
Total		35300	57

FREE GEOINFORMATION SYSTEM "ALIEN PLANT SPECIES OF EUROPEN RUSSIA"

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The necessity for making database (DB) with Internet access or web oriented information systems based on alien species finds was repeatedly discussed in the literature (Panov et al., 2004, 2006; Dgebuadze et al., 2008). The pressing need of establishment of such a system is determined first of all by a lack of exact information on species distribution and correct differentiation of species primary and secondary ranges, different approaches to species taxonomy and evaluation of species invasion status in individual regions, and inaccessibility of some regional data.

The site "Alien plant species of European Russia" (http://geocnt.geonet.ru/googlemap/) includes geoinformation system (GIS) based on the DB "AliS" of alien plant species of European Russia (Morozova, 2002). The Internet DB contains both published and unpublished information on species finds beyond limits of species natural ranges and fixed in this territory. For publication in the Internet, the data are located in a free relational database management system MySql, which allows storing both attributive and spatial information. The Web Map Service (WMS) of MapServer with an open source was used for data representation. The spatial information as a graphical depiction and attributive information as a text description are available on request from WMS. Text description of each species includes species taxonomy, synonyms, morphological description, biomorphological and biological attributes, ecological characteristics, species distribution (natural range and settling beyond own) and pathways of introduction. Many characteristics are formalized and can be used for scientific analysis and thematic mapping. Thus, it can be used both for data publication on the Internet and for data operation in the local GIS. For Internet representation, the Google maps are used as a cartographic basis, and the layer formed by WMS is overlaid on it. The users receive tools for managing the scale, for requesting the information on an object, and for adding his finds directly to the map.

The Web GIS play the role of species atlas. Only 37% of alien plant species found in various regions of European Russia were aliens to this territory in the whole (aliens *to* European Russia), i.e. these species had their native ranges entirely outside the boundaries of European Russia. The native ranges of other alien species (alien *in* European Russia) partly include some regions of European Russia. In many Russian floristic papers a distribution of species are given in common, and primary and secondary areas are not divided. In the Web GIS distribution of species is shown separately as primary and secondary ranges, and in addition with an invasion status of species in regions.

Besides atlas function, the Web GIS will make to solve another various tasks. First, it may serve as an early detection mapping system of alien plants in different regions of European Russia and species monitoring in this territory; in the GIS, new finds of alien species can be input directly via the Internet. Secondary, it will be helpful in the evaluation of alien species invasion risk in a region, and in compilation of aliens for individual regions. Third, the GIS allows matching species and environment information. For this, we used the grid system by means of which species distribution is mapped in Flora Europaea that also allows to compare our data with those from European countries and to receive a complete image of secondary species' ranges.

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INVASIVE SPECIES OF BIVALVE MOLLUSCS IN ECOSYSTEMS OF LOWER PRUT

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The Prut River is the last major left bank tributary of Danube river and the second largest river in the Republic of Moldova. The length of lower river section – 445 km.

In lower Prut river a first occurrence of invasive bivalves in 2003 was noted in the Lakes Manta and Beleu the shells of invasive Asian species *Sinanodonta woodiana* (Lea, 1834), with a shell width of 12.5 cm (4–5 years old). The first live specimens were collected in 2008 in Lake Beleu. The minimum size of individuals was 1 cm, the maximum – 16.6 cm. In the river water *S. woodiana* was firstly found in 2010. Currently, the number in Prut river ranges 0.25–1.4 ind./m^2 and biomass 36–260g/m^2.

There is a high rate of reproductive maturation of this species in the recipient region, similar to the one observed in the region of origin. The specimens with a shell length of 5.5 cm (1–2 years old), had developed glochidia in the marsupiyah. In addition, a high survival of it was observed. For example, specimens with completely destroyed ligament, lived in the laboratory for two months, even after their storage for 3 days in the refrigerator, without water. The ability of sinanodonta to restore its seriously damaged shell, its possible owing to its high capacity to survive and increase its weight by 50%. The native species of bivalves, with similar injuries would die in such conditions. This is another competitive advantage together with the high growth rate in the biological communities of lower Prut river. There is a continuous movement of sinanodonta upstream of the river.

In 2009 *Dreissena bugensis* (Andrusov, 1897) was recorded, firstly this species being identified in Moldova, in 2004 in Dniester river. In general, this species occurs in the middle part of Prut river. In the lower part of the river single specimens of *D.bugensis* were found on unionid shells, abundance and biomass varied between 53–80 ind./m^2 and 88.524–97.45 g/m^2 respectively.

In 2009 *Corbicula fluminea* an Asian invasive species was registered (Müller, 1774). In 2010, the population size has increased to 200 ind./m^2. After the flood in summer 2010, and until November 2011 corbicula was not met. Currently its number varies 4–40 ind./m^2 and the biomass 5.6–44.704 g/m^2. The population of corbicula occuppies an area from the mouth of Prut river to Cislita Prut (15 km from the mouth). The reason for restricting its movement to upstream section of the river, is probably linked to the unfavorable conditions in the area. Given the phenotypic diversity of shells, and the absence of this species in the samples after the flood, we can assume that the population was regularly renewed and maintained by the introduction from the Danube river during its planktonic larval stage.

The above mentioned alien species of bivalves, outcompeting native species, dominating by their abundance and biomass in some samples, indicates a significant biologically contamination of Lower Prut ecosystems.

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NON NATIVE SPECIES OF BEETLES IN THE REPUBLIC OF MOLDOVA: A REVIEW OF THEIR ORIGIN, INTRODUCTION AND MAIN IMPACT

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Invasive alien species represent nowadays one of the major environmental issues in ecosystem conservation. Alien species alter ecosystems structure and function and can eventually lead to the extinction of native species. They also cause important economic and human health impacts.

In the Republic of Moldova forest and agricultural ecosystems are the most exposed to non native species introduction and establishment. The geographical position of the republic at the crossing point of three biogeographical zones (Central European, Eurasiatic and Mediterranean) along with the intense human activities – such as agriculture and/or forest management make them specially prone to alien species colonization. Furthermore, human activities often cause biotic and abiotic alterations to which exotic species can be better adapted than native species. Vulnerability of ecosystems to alien species introduction is probably one of the least studied and most difficult questions.

To better understand how to manage and control non native species in transitional natural and agricultural ecosystems in the Republic of Moldova, it is extremely important to know: which species had been introduced, which are better established and/or spreading, which are their origins and introduction pathways, as well as their impacts. Only in this manner the most efficient methods to i) prevent new introductions and/or spread, and ii) reduce their impacts, can be proposed and implemented.

In this study, the presence of exotic beetles species in forest and agricultural ecosystems in the Republic of Moldova was reviewed, along with their native range of distribution (origin), introduction pathways and major environmental, economic and health impacts. An exhaustive review of ca. 300 references (scientific papers, books, reports, internet database searches, and unpublished records from experts) was performed. A total of 113 alien beetles were found on the investigated territory. Taxonomical analysis showed up that those beetles belong to 18 families and 83 genera, among which the families *Curculionidae* and *Staphylinidae* (with 25 species each) are predominant. The largest number of introduced beetle species originated from European region (50%), followed by Eurasian (20%), Asian (6%), Mediterranean (3%) and American 4%.

Among the principal impacts, exotic species usually alter the habitat and/or out compete native species for food and space. They can also reduce native biodiversity by predation (e.g. *Harmonia axyridis*, *Mylabris variabilis*, *Sphaeridium bipustulatum*). Furthermore they often cause economic impacts: they can affect agricultural crops (e.g. *Aclypea undata*, *Meligethes aeneus*, *Bruchus pisorum, Psylliodes chrysocephalus*, *Gonioctena fornicayta* and *Leptinotarsa decemlineata*), forest ecosystems (e.g. *Lignyodes bischoffi*, *Scolytus laevis*, *S. pygmaeus* and *Xyleborinus saxesenii*), and stored products (*Alphitophagus bifasciatus, Tribolium castaneum*, *T. confusum*, *T. destructor*, *Alphitobius diaperinus*, *Callosobruchus chinensis* and *Sitophilus oryzae*).

BIO GEOGRAPHICAL REGIONS DEFINED BY AQUATIC NON INDIGENOUS SPECIES ASSEMBLAGES

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Biological traits and regional environmental conditions are one of the main limiting factors for non indigenous species (NIS) distribution. It is reasonable to think that NIS assemblages may significantly identify bio geographical regions according to species presence or absence in each country. We used AquaNIS (the information system on aquatic non indigenous species) to analyse distribution pattern of NIS in European Large Marine Ecosystems (North Sea, Baltic Sea, Celtic Biscay Shelf, Iberian Coastal and Mediterranean Sea). In total we used data on 1003 variables (species) and 40 samples (country regions) organized in presence absence form. The result of the cluster analysis (PRIMER v6) is visualized by a dendrogram, where 5 clusters may be identified. The null hypotheses that there are no assemblage differences between selected groups (formatted according to 10, 20, and 30 similarity levels by SIMPROF) using analysis of similarity (ANOSYM) was tested. According to generated p and R values, the hull hypotheses were rejected in each case identifying that clusters were significantly separated. The paper discusses the new biogeographical pattern evolving from the introductions of NIS in European regional seas.

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THE WEED AND ALIEN PLANTS OF YAKUTIA

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The first data on weed plants of Yakutia are provided in Determinant of weeds of Yakutia (Tarabukin, 1932). Rather recent generalizing report on synanthropic vegetation of Yakutia in which the list of weed plants is provided, is M. M. Cherosov's monograph (2005). Sinantropic vegetation of Yakutia the monograph of group of authors (Cherosov, etc., 2005) is devoted to syntaxonomy also. Due to the studying of flora of Verkhoyansk Ridge and an invasion to this mountain system of the alien species, some materials were published also by the author of this message (Nikolin, 2011, 2012a, b). The list of the highest plants of Yakutia continues to be updated and improved. According to the last audit of flora of this region, in its structure 1987 species are (Kuznetsova, Zakharova, 2012). The concept "weed plants" isn't always perceived unambiguously as not all plants once noted in weed habitats can be referred to this category. In this regard author's audit of the weed plants, accompanying activity of the person, in the territory of North East Asia – Yakutia occupying the space of 3103.2 thousand sq. km is offered.

Taking into account opinion of previous researchers (Tarabukin, 1932; Karavaev, 1958; Determinant of the highest plants of Yakutia, 1974; Cherosov, 2005; Kuznetsova, Zakharova, 2012), and also data on behavior of plants in other regions (Nikitin, 1983; Vinogradova, 2012; Lysenko, 2012, etc.), it is possible to carry 792 species (40% of flora) to number of plants, companions of the person, including the active native types capable quickly to become populated and restore broken by the person of a habitat in Yakutia. This number includes 530 native species (apophyts), 82 species widespread in natural habitats, but showing high tendency to anthropogenic territories and 180 (9% of flora) adventitive species.

Not all from called above quantity of plants treat actually the weed. Those, in broad understanding of this term, including plants of natural and agricultural grounds (segetal sites), ruderal sites (garbage, wastelands, tall grass), plants of the special areas, from the highest flora of Yakutia it is possible to consider 542 species (27%). Including 369 species of apophyts and 173 adventitive species. The alien flora is represented by 138 adventitive species (7%) and 23 species from number apophyts, raising some doubts in their origin (possibly, invasive).

The territory of Yakutia on a complex of physiographic factors is a little susceptible to an invasion of alien types. The low density of weed plants is explained unit of area – 0.00017 species/sq. km (alien types – 0.00004 species/sq. km) by it. The quantitative indices given in theses need the explanation more concretized and developed information that is planned to execute in the next publications.

TRANSFORMATION OF ICHTHYOCENOSIS OF NATURAL AND ARTIFICIAL WATER RESERVOIRS OF UKRAINE AS A RESULT OF INVASION OF ALIEN FISH SPECIES

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At present fauna of biocenosis of Europe is annually gone through significant transformations, including invasions or naturalization of invasive and alien species.

The problem of alien species for European countries is of great ecological and socio economic importance. There is an increasing number of large ecological disasters caused by bioinvasions of different species. The possibility of spontaneous penetration of new aggressive animals into natural and artificial water reservoirs raises.

It is known that, compared to the native species, invasive fish, for example, have tremendous capacity to adapt. «Aliens» quickly learn the variety of statials, aggressively guard their egg masses. They are characterized by considerable reproductive capabilities. They are also direct trophic competitors for valuable fish species.

Extraordinary quantitative indicators of alien fish (*Pseudorasbora parva*) are marked even today in shallow waters of Dnieper reservoirs – more than 423 specimens for 100 square meters (!). It is significant that at the same time species diversity in the studied statials has sharply decreased over the past 10 years (by 25–37%). It is noted that in 2011–2012 in small rivers tributaries areas of the Dnieper, the number of *Lepomis gibbosus* has sharply increased, and the number of young fish species in the littoral zone has decreased to 4–5 (vs. 10–14 in previous years).

Fish invaders sharply increase the amount of egg masses, the number of egg portions in order to survive in biotope recipients and further effective naturalization. For many species (*Rapana thomassiana, L. gibbosus, Perccottus glenii, Nyctereutes procyonoides* and others) the use of new trophic objects is marked. For example, in spring the predator L. gibbosus has up to 80% of aquatic vegetation as food in waters of central Ukraine (Новіцький 2012).

Invasive species (*P. parva, L. gibbosus*) protect the places of egg laying more aggressively and «control» habitual statials. In addition, some interesting behavior features of alien species are outlined. Such as, for example, the creation of mixed flocks (*L. gibbosus*), and we can mark in total flock both young fish (one year olds) and specimens up to 5–7 years of both species (Новіцький 2012).

Of course, these physiological and behavioral adaptations of invasive species are aimed first of all to overcome the possible competition with native animals. They lead to successful adaptation of alien species and their naturalization in natural and artificial reservoirs on the background of destabilization of quantitative and qualitative structure of populations of many native species.

It is now necessary for the state to pay close attention to the problem of alien species. Ignoring of bioinvasion is capable to cause considerable economic damage and can be interpreted as a threat to national security of any country.

APPEARANCE OF THE DIATOM *CHAETOCEROS CF. LORENZIANUS* IN THE LITHUANIA COASTAL WATERS OF THE BALTIC SEA: RANGE EXPANSION OR HUMAN MEDIATED INTRODUCTION

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The diatom *Chaetoceros* cf. *lorenzianus* Grunow, 1863 appeared the Lithuanian coastal waters in October 2005, prior to that it was recorded for the first time in Polish waters in 2003. The status of the species in Lithuanian and Polish waters (South Eastern Baltic) remains unclear. Generally, *C. lorenzianus* may be considered a cosmopolitan species, occurring in various marine regions of the World, such as Mediterranean and Black Seas, tropical zone of the North and South Atlantic Ocean, Asian coast of Pacific Ocean, Australia and New Zealand. The nearest known location where this species occurs is the entrance region to the Baltic Sea (Kattegat and the Belts area), where salinity ranges from 11 to 26 psu. There is the discontinuity in the distribution of that species between the entrance region and the SE Baltic, the gap is approximately 500 km. Another interesting fact is that in the SE Baltic the species was found within salinity ranging from 3.8 to 7.4 psu. There two possible explanations of the appearance of that diatom species in the SE Baltic. First, is that the species could be transferred by an unusual inflow of Kattegat water (18 psu) which may have stayed close to the surface long enough because the water was warm (14ºC). An alternative explanation is that the species could be transferred by ballast water of ships, taking into account regular shipping between Klaipeda, the sea port of Lithuania and ports in the Belts area. In any case, the fact that this species have established itself in the area with distinctly lower salinity may indicate that the environmental conditions became more tolerable for that generally marine species. In recent years, *Chaetoceros* cf. *lorenzianus* became a common and abundant species in autumn phytoplankton. In 2012 it was also recorded in summer (August) plankton as a dominant species.

AN INFORMATION SYSTEM ON AQUATIC NON INDIGENOUS SPECIES (AQUANIS)

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Scientific and managerial attention to bioinvasion problem results in growing number of electronic resources on non indigenous species (NIS). Currently there are more than 250 websites on NIS worldwide. The geographical scope of these information resources varies from global (e.g. GISD), pan European (e.g. EASIN) to regional (e.g. Baltic Sea Alien Species Database; CIESM Atlas of Exotic Species in the Mediterranean) and national (Polish Alien Species database). NIS databases are increasingly being used for many aspects of bioinvasion research, e.g.: to aid the compilation of NIS lists for specific areas, to prioritize the most impacting NIS, to define the major pathways and vectors responsible for NIS introductions, to analyze species traits and ecological preferences, to assess the risks posed by alien species on economies and ecosystem services. Here we present a new approach to development and management of NIS databases – AquaNIS, the information system on aquatic non indigenous species. AquaNIS differs substantially from existing NIS information sources in its organisational principles, structure, functionality, and output potential for end users. The system is designed to assemble, store and disseminate comprehensive data on NIS, and assist the evaluation of the progress made towards achieving management goals. Key issues related to electronic information systems, such as data management principles and long term database maintenance, are discussed.

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HEAT LOVING AND EASTERN PACIFIC MIGRANTS IN ICHTHYOFAUNA OF THE PACIFIC WATERS OFF THE NORTHERN KURIL ISLANDS AND KAMCHATKA IN XX–XXI CENTURIES

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Records of head loving fishes in the northwestern Pacific are mostly associated with the periods of warming and may serve as indicators of certain oceanological processes. These processes also result in penetration to Asian coasts of representatives of ichthyofauna from the northeastern boreal Pacific where their main ranges are located. During the past century (since 1920's), 32 heat loving species and 12 eastern Pacific species of fishes and fish like animals from 34 families were registered. Some of them (shortfin mako *Isurus oxyrinchus*, Japanese gissu *Pterothrissus gissu*, opah *Lampris guttatus*, skilfish *Erilepis zonifer*, arabesque greenling *Pleurogrammus azonus*, manefish *Caristius macropus*, medusafish *Icichthys lockingtoni*) are known only by single records, while others appear off the northern Kurils and Kamchatka rather often, sometimes in large amounts. The most abundant and frequent representatives of head loving species in XX XXI centuries were Pacific saury *Cololabis saira* and longfin codling *Laemonema longipes*, while those of the eastern Pacific species were sablefish *Anoplopoma fimbria* and arrow tooth flounder *Atheresthes stomias*. By this, approaches of Pacific saury to the southeastern Kamchatka sometimes were so huge that in 1958 possibility of its commercial fishery in this area was specially considered by Kamchatka's Sovnarkhoz (Polutov et al., 1966).

Since spawning and feeding grounds of longfin codling are geographically separated (Kodolov, Pautov, 1986), its juveniles upon transition to active mode of life start to migrate northward from Japanese coasts along the Kurils, penetrate into the Sea of Okhotsk through deep water straits of the southern Kurils and aggregate off the Alaid Trench. In the periods of species' high abundance, part of feeding juveniles is able to migrate from this area to the Pacific waters off the northern Kuril Islands and Kamchatka through rather shallow Fourth Kuril Strait (Tokranov, Orlov, 2006).

According to modern concepts (Dudnik et al., 1998; Orlov, Biryukov, 2003; Tokranov, Orlov, 2007) there is dependent population of sablefish off the Asian coast, which abundance is mostly associated with the yield in the northeastern Pacific, migrations from latter area of adult sablefish and transfer of pelagic juveniles to the western part of the ocean. However, some scientists assume sablefish spawning in the Pacific waters off Kamchatka and northern Kuril Islands (Novikov, 1994; Orlov, Biryukov, 2003) but it is not known for sure whether young sablefish survives here or not.

Male arrow tooth flounders occur off Asian coast in insignificant amounts that prevents normal insemination of eggs laid by females. This fact resulted in hypothesis (Novikov, 1962) that arrow tooth flounder spawn in this area with the use of gynogenesis. However, in 1990's another explanation was proposed (Dolganov, 2000). According to this hypothesis, there is normal mode of reproduction of this species off the American coast. Eggs and larvae are transported by currents far away from spawning areas reaching Pacific waters of Kamchatka and northern Kurils and even northeastern Sea of Okhotsk. Since male arrow tooth flounders mature 2 3 years earlier as compared to females, they start first to migrate toward spawning grounds. This results in considerable predomination of females in Asian waters.

ECOLOGICAL CATASTROPHE: THE EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) IS DESTROYING ASHES IN NINE OBLASTS OF EUROPEAN RUSSIA

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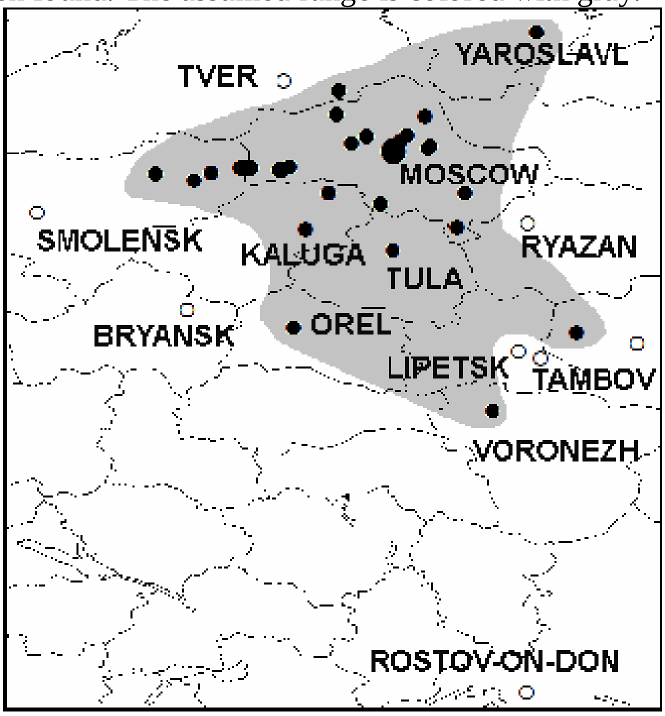
The emerald ash borer *Agrilus planipennis* is the most dangerous invasive pest of ashes. It has killed millions of ash trees in North America. In 2003 the pest was firstly found in Europe in the city of Moscow. Then it was found in some localities of Moscow oblast and Smolensk oblast. Our examination of ash trees in 19 cities of European Russia has revealed, that the invasive area is much wider than it was previously believed. The pest has been found in Konakovo (Tver oblast), Michurinsk (Tambov oblast), Tula, Kaluga, Orel, Voronezh and Yaroslavl. We have found out, that *A. planipennis* damages not only *Fraxinus pennsylvanica* (American species which is commonly planted in cities), but also the aborigenous European ash *Fraxinus excelsior*. The most of ashes in Moscow oblast are dying or already dead. Thousands of trees in other regions are seriously damaged. The pest is spreading rapidly. Obviously, it will cross the western border of Russia within the nearest few years. Ashes in cities, forests and protective forest belts both in Russia and other countries are in danger.

The range of *A. planipennis* in European Russia is shown in the map. Black dots – localities, where the pest has been found, white dots – localities, where the trees have been examined, but the pest has not been found. The assumed range is colored with gray.



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INVASIVE AND POTENTIALLY INVASIVE PLANTS IN THE FLORA OF THE BRYANSK REGION

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The «black list» of the Bryansk region flora, including 100 alien plants, is compiled. The «black list» plants are divided into six groups, according to the classification recommended for keeping Black books (Notov et al., 2010; Vinogradova et al., 2011) with amendments.

Invasive plants

1 – species–"transformers", which get actively invaded into the natural and semi natural communities, change the appearance of ecosystems, violate succession processes, act as edificators, repress native species and prevent from their reproduction: *Acer negundo*, *Acorus calamus, Amelanchier spicata*, *Aster* × *salignus, Echinocystis lobata, Elodea canadensis, Heracleum sosnowskyi*, *Lupinus polyphyllus, Solidago canadensis, S. gigantean, Zizania latifolia.*

2 – alien species, actively invading into natural and semi natural communities; invasions in the region are marked as regular: *Bidens frondosa*, *Conyza canadensis*, *Erigeron annuus, Festuca arundinacea*, *Impatiens glandulifera, I. parviflora*, *Juncus tenuis*, *Oenothera biennis, O. rubricaulis*, *Salix fragilis, Sambucus racemosa*, *Xanthium albinum.*

3 – alien species introduced in the natural and semi natural communities; invasions in the region are now rare: *Amorpha fruticosa, Cardaria draba, Cornus alba, Crataegus monogyna, Epilobium pseudorubescens*, *Eragrostis pilosa*, *Fraxinus pennsylvanica*, *Festuca trachyphylla*, *Galega orientalis*, *Grossularia reclinata*, *Hippophae rhamnoides*, *Helianthus tuberosus*, *Hemerocallis fulva, Lolium perenne, Reynoutria japonica*, *Robinia pseudoacacia, Parthenocissus inserta, Populus alba, Quercus rubra*, *Thladiantha dubia, Sambucus nigra, Sorbaria sorbifolia*, *Solidago gigantean, Spirae alba, Vinca minor, Viola odorata*.

4 – species whose populations have both native and alien character in the territory of the region: *Lathyrus tuberosus, Melilotus albus, Myosotis sylvatica, Saponaria officinalis*.

Potentially invasive plants

5 – alien species actively spreading in anthropogenic habitats, subsequent to further naturalization some of them will be able to penetrate into the semi natural and natural communities: *Anisantha tectorum, Asclepias syriaca, Ballota nigra, Centaurea diffusa, Chamomilla suaveolens, Cyclachaena xanthiifolia*, *Echinochloa crusgalli*, *Elsholtzia ciliata*, *Epilobium adenocaulon*, *Galinsoga parviflora, G. quadriradiata, Geranium sibiricum, Lepidium densiflorum*, *Melilotus officinalis, Oenothera villosa, Puccinellia distans, Senecio viscosus, Setaria viridis, S. pumila, Xanthoxalis stricta.*

6 – alien species identified in Central Russia as invasive: *Amaranthus albus*, *Amaranthus retroflexus, Ambrosia artemisiifolia, A. trifida, Armoracia rusticana, Aronia mitschurinii*, *Bellis perennis, Caragana arborescens, Eragrostis minor, Lactuca serriola, Leymus racemosus, Lonicera tatarica, Medicago saliva, Phragmites altissimus, Physocarpus opulifolius, Phytolacca acinosa, Rosa rugosa, Rudbeckia laciniata, Rudbeckia hirta, Sambucus ebulus, Sisymbrium loeselii*, *Spiraea salicifolia, Symphoricarpos albus*, *Symphytum asperum*, *S. caucasicum, S. x uplandicum, Trisetum flavescens, Ulmus pumila.*

MECHANISM OF REGULATION OF INVASION IN MARINE PHYTOPLANKTON

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Long term field researches of phytoplankton community structure recorded emergence as a part of a leading phytoplankton complex of invasive Mediterranean diatom algae species – *Chaetoceros minimus* and *Chaetoceros throndsenii*. These species were noted in 2005, 2006 and 2011 in May–June during the coccolithophorid *Emiliania huxleyi* blooming. After rough flash of growth these algae weren't fixed in a community. In laboratory experiments the main growth characteristics of diatoms were defined. It became clear that these characteristics were close to that of coccolithophorid *E. huxleyi*. As well as the coccolithophorid, these diatoms are extremely undemanding to nitrogen and phosphorus concentration in sea water and can successfully grow at their low values. Such conditions are developed during the periods of summer stratification in the top mixed layer separated from biogen rich underthermocline waters by a sharp gradient thermocline. The data on the growth parameters received in laboratory experiments in 2005 and 2011 were used in computing experiments on mathematical model, where dynamics of invasive species (*Chaetoceros minimus* and *Chaetoceros throndsenii*) and the main dominant Black Sea phytoplankton – coccolithophorid *E. huxleyi* – were considered. It is shown that at a speed of water exchange in the top mixed layer over 10% per day the system coccolithophorid small cellular invasive diatoms collapses, and these diatoms disappear from a leading complex.

Theoretically there are conditions under which *Chaetoceros throndsenii* can be fixed in an ecosystem. These are raised (slightly higher, than that of *Emiliania huxleyi*) nitrogen concentration at water layer stratification for a long time (not less than five months). It is obvious that these conditions for the Black Sea are a little realistic. The coexistence of coccolithophorid *E. huxleyi* and this invasive speciae can occur in conditions when the coccolithophorid and *C. throndsenii* have different limiting factors: for coccolithophorids it is phosphorus concentration, and for *C. throndsenii* – nitrogen concentration.

As for *Chaetoceros minimus*, a factor limiting growth of this alga as well as of coccolithophorid one is phosphorus. However owing to the invasive diatom’s higher need for this element of, its distribution in the water area of the northeastern part of the sea was limited.

In general, *C. minimus* grows predominantly at N/P ratio less than 4, *C. throndsenii* – at N/P ratio between 4 and 8. With further decrease of phosphorus concentration both species stop to grow.

CONTENTS OF CHEMICAL ELEMENTS IN THE TISSUES OF NON INDIGENOUS SPECIES, MEDITERRANEAN MUSSELS AND PACIFIC OYSTERS IN THE SOUTH AFRICAN COASTAL WATERS: POTENTIAL IMPACT UPON WATER QUALITY AND IMPLICATIONS FOR ENVIRONMENTAL IMPACT ASSESSMENT

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It is well known now that invasions of alien species may result in the drastic changes in the structure and functioning of recipient ecosystems. Much less is known yet about one of the potentially very serious consequences of introduction of non indigenous species – modification and transformation of biogeochemical cycling of chemical elements in the ecosystems under impact of invaders. Our earlier studies in the freshwaters revealed that filter feeding invasive bivalve mollusks accumulate large amounts of chemical elements removing them from water column and transferring to benthic food chains and further to the higher trophic levels. This may drastically change the patterns of chemical cycling and balance of chemical elements in biota. From the anthropocentric point of view this aspect of invasion is important since it concerns the qualities of water and of the bioresources (such as of edible invertebrates and fish) served as food for human beings. Comparing to the freshwaters even less is known about biogeochemical role of invasions in the marine environment.

The South African coastal waters give one of the most striking examples of mass introduction and establishing of populations of alien bivalve mollusks directly influencing the native ecosystems. This relates to the mass development of non indigenous Mediterranean mussels, *Mytilus galloprovincialis* (introduced from Europe in 1984 and now is the dominant mussel on the South African West Coast) and farmed Pacific oysters, *Crassostrea gigas* (the species intensively farmed in the coastal waters). Nowadays both species produce a huge biomass and being filter feeders necessarily affect the biogeochemical cycling the coastal ecosystems. However the scales, importance of this effect as well as their consequences for the quality of environment and bioproducts are unclear.

The present paper describes the results of the pilot study aimed in clarification of the above mentioned uncertainty by the assessment of tissue levels of chemical elements accumulated by non indigenous bivalve mussels, Mediterranean mussel and Pacific oyster in the South African coastal waters. The tissue (soft tissues and shells) samples of both species were collected in Saldanha and Danger bays of the SAR Atlantic coast and analyzed using epithermal neutron activation technique for contents of more than 30 chemical elements including micronutrients/heavy metals.

The study revealed that both mollusks accumulate high tissue concentrations of the studied elements. The burdens of the elements in the tissues of mussels from studied bays differed reflecting differences in the environmental conditions in the compared habitats. Comparison of tissue levels of analyzed elements in the mussels and oysters revealed that only the level of Br was significantly higher in the shells of black mussels than oysters. The contents of all other studied elements (Cd, Zn, Cr, Se, Fe, Co) were considerably higher in both tissues of oysters. This may reflect species specific differences in the metabolic rates of compared mollusks. Revealed contents of all chemical elements except for Cd are relatively low, at the levels of "essential micronutrients" but not of "contaminants". The content of Cd approaches the maximal acceptable level indicating the necessity to study this element in scrutiny. The study has shown that both introduced Mediterranean mussels and farmed Pacific oysters affect biogeochemical cycling and the scales, consequences and implications of this effect are worth of further research in scrutiny.

METHODOLOGICAL PROBLEMS OF ASSESSING THE IMPACT OF THE RED KING CRAB IN THE BARENTS SEA ECOSYSTEM

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The introduction of the red king crab (Paralithodes camtschaticus) in the Barents Sea ecosystem has occurred over half a century ago, but its population still continues its expansion into the waters of the reservoir.

The most important factor in determining the limits of growth of the population of red king crab is the provision of food supply. This aspect also allows us to estimate the impact of this species in the ecosystem and accommodating to simulate potential conflicts with indigenous species.

From the methodological point of view, the most difficult aspect of assessing the impact of the red king crab in the Barents Sea ecosystem is the assessment of his diet during the annual cycle of migration.

First, for different age groups, the crab migrate differently. Secondly, the migration crabs move between habitats, biomass feed (for crab) benthic differ by several orders of magnitude.

The present study consisted of the following stages:

1. Carrying out general analysis of migration activity of different age groups and different sexes crab for a year and determine the total time that this or that group spends in different habitats.

2. Synthesis of the available data on biomass feeding benthic habitats are available for different groups of king crab

3. The calculation of the consumption of food benthos different groups of king crab for a year in a given biotope

4. The calculation of the annual balance of consumption of food benthos in a particular area of the Barents Sea.

As a model of the object were taken an isolated cluster of crab that lives in the Russian waters of the Varanger fjord in the Barents Sea, in which there is good long term data on population and migration activity. Data on biomass feeding benthos in the habitat were obtained as a result of their own benthic surveys (up to 50 m) and from the literature.

The analysis showed that during the annual migration cycle, up to 70% of the diet consumed in coastal shallow waters (up to 50 m) in ecosystems, confined to shingles, shell rock, boulders and rocks. The role of benthic fine soil (sand, silt) in the diet of red king crab in the Barents Sea is much lower than in areas of its native habitat in the seas of the North Pacific.

ALIEN AND INVASIVE GAME ANIMAL SPECIES IN LITHUANIA

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During the last century was very popular to introduce alien game animals in Lithuania. The main aim was to increase the abundance of game fauna and to improve the productivity of hunting areas. Commonly, the introduction was performed spontaneously and without scientific background. The introduction of the alien species disturbs or can disturb steady nature balance. The aim of work is to define the status and condition of alien game animal species population in Lithuania. In the last century was attempted to acclimatize 12 species of mammals and 4 species of birds, listed as game animals. These animals can be divided into 4 groups: 1) the acclimatization was successful 2) the acclimatization was partly successful (animals adopted to Lithuanian climate conditions, but due to other factors, cannot live in a wild) 3) the acclimatization was not successful (introduced animals disappeared) 4) the acclimatization process was unclear, it was stopped.

The new list of invasive species were promulgated in Lithuanian Republic in 2012. In the list of invasive species there are 17 animal species and 5 of them are mammals: The Raccoon dog (*Nyctereutes procyonoides*), the Canadian mink (*Mustela vison*), the Muscrat (*Ondatra zibethica*), the Raccoon (*Procyon lotor*), the Grey rat (*Rattus norvegicus*) and one species of bird: the Canadian Goose (*Branta canadensis*). Five of invasive species are listed as a game animals: the Raccoon dog, the Canadian mink, the Muscrat, the raccoon, the Canadian Goose. The Raccoon dog and the Canadian mink are very abundant species in Lithuania. The Muskrat was very abundant before, but during the last 3 decades – population size has decreased. The Raccoon is still very rare in Lithuania. The Canadian mink is rare, but population is increasing. Invasive mammals can be hunted all year long, without limits. Hunting tradition of the invasive bird – The Canadian Goose has not started yet.

RACCON DOG (*NYCTEREUTES PROCYONOIDES* G.) POPULATION CONDIION AND STATUS IN LITHUANIA

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The Raccoon dog was not introduced in Lithuania: it is supposed he came from neighbor countries because it was introduced in Belarus (1936) and Latvia (1948). In Lithuania Raccoon dog first time observed in 1948 in Eastern part of the country.

First period 1948–1960. This period took 12 years and Raccoon dog appeared in new territories and spread along all the country. On the end of this period (1960) the population of Raccoon dogs reached 3000 in Lithuania.

Second period 1961–1973. This period took 13 years and it was population size increasing period. The abundance of population was increasing rapidly, in average about 700 animals annually. Third period 1974–1982. This period was decreasing of population abundance period. There were few reasons for rapid decrease of population: the hunters got more experience of Raccoon dogs hunting and were able to hunt more animals (3000–2000) annually. Also it was observed many sick individuals (decease was unknown).

Fourth period 1983–1997. Was a period of stable population however the abundance was slightly increasing. In the beginning of period it was about 4000, and in the end about 7000 individuals.

Fifth period since 1998. The census of Raccoon dogs was not performed, but due to the game bag statistics it is possible to predict Raccoon dogs population was increasing.

In Lithuania Raccoon dog is recognized as invasive species now and it is allowed to hunt it all year round.

QUASI-PERIODIC FLUCTUATIONS OF EUROPEAN BEAVERS (*Castor fiber* L.) ABUNDANCE IN THE PRIOKSKO-TERRASNY NATURE RESERVE

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The analysis of different classes of models for short- and long-term forecasting of population dynamics of local populations of Prioksko-Terrasny Nature Reserve (PTZ) beaver's is presented. Origin of local populations were given by 2 pairs of beavers introduced in PTZ in 1948–1955 years, and in the buffer zone in 1937–1940 years. Long-term data on the population dynamics of the beaver's and the number of their settlements in the PTZ obtained from the analysis of all the available sources from 1948 to 2006, and monitoring that we performed in the PTZ in September – November 2007–2011 years. To determine the "power" of settlements and the number of animals following scale was used: small settlement – 1–2 beaver's, the middle settlement – 4 beaver's, a big settlement – 6–8 beaver's. The first class of models consists of two blocks, and includes a linear and nonlinear regression models. Although the linear regression model shows a trend and random fluctuations around it, however, it can not be used to build predictive values inability account cyclical components of variations. Non-linear regression models were used primarily for the realization of the modified discrete classical models of Malthus, Beaverton-Holt and Ricker. These models were used for estimating the reproductive potential of populations, ecological capacity of the habitat, parameters of the annual reproduction and intensity of migration flows. A limitation of these models, in particular, is its failure to build forecasting of the population's size, since these classical models are not designed for this purpose. The second class of models is based on the method of time series analysis. This method consist of to briefly describe the dynamic of a population size using different mathematical models (linear and nonlinear trends, models like – MA, AR, ARMA and the random walk model) that adequately describe the monitoring data, and allow to construct a short-term forecast. The analysis of a time series data has shown that the most appropriate models are integrated autoregressive and moving average (ARMA). It is shown that the ARMA – models can be used to predict the population size for the time interval includes less then 5 years. It is important to note that these two types of models are quite sensitive to the missing data, and the implementation of these methods was provided using various heuristic procedures to recover the missing data.

It was revealed that one of the most effective ways to analyze the dynamics of population abundance – an ecological model of population dynamics. For a quantitative analysis of PTZ dynamic of abundance, demographic parameters and the use of available resources by beaver's was developed discrete (finite-difference) in time model. It is shown that the dynamics of the population size tends to a steady state with quasi-periodic component of 14 to 26 years. The population model shows that the periodic component has a sawtooth form, with the number of beavers increasing from minimum to maximum every 6 years, and redusing from maximum to minimum value for the rest of the period. The oscillation amplitude of the quasi-periodic component is about 6 beavers and has a slight tendency to increase. We assume that the further development of the beaver population will depend on many random events that contribute to the change in the beaver regulatory factors, such as geomorphologic features of the area, recovery rate of feed resources in abandoned habitats, the extent and rate of development of beaver settlements. Stability analysis of stationary solutions and the assessment of model adequacy suggest that the proposed discrete model can be used to quantitatively assess the dynamics of beaver populations on other territories depending on the food resources availability.

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ALIEN SPECIES IN THE PELAGIC ZOOPLANKTON OF THE SARATOV RESERVOIR: INVASION, NATURALIZATION, PLACE IN THE ASSEMBLAGE

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Data acquired from literature along with the results of the original research performed in 2004–2012 y. are generalized. Two zoogeographical complexes of alien species are revealed; time of their invasion in the reservoir, seasonal dynamics of their number and biomass, sexual and age composition, their share in the total number and biomass of the pelagic zooplankton are investigated.

According to the results, obtained during the study of the alien species of zooplankton of the Saratov reservoir we can make a series of conclusions:

1. The destruction of the rheophilic river communities with subsequent emerging of the unique quasi natural ecosystems led to the total reorganization of the pelagic zooplankton. As many of the human disturbed communities, reservoirs appeared to be vulnerable for invasions of the alien species.

2. During the first decades of the reservoirs existence, in the pelagic zooplankton native and Boreal Arctic species predominated, however in the end of the XX – beginning of the XXI century tendency of the prevailing of the Ponto Caspian alien species was outlined.

3. Despite the presence of the native predatory zooplankton species, among the 19 alien species there are 9 predators. All the species invading the reservoir since the 1990s are selective predators. Predatory Ponto Caspian species play exceptionally important role in the summer zooplankton of the Saratov reservoir. They can produce 30% of the total biomass (in the singular cases up to 70%).

4. Invasion processes in the communities of the Saratov reservoir are still ongoing. Despite the decrease of share of the Boreal Arctic species, complete replacement of one of the "ecological analogue" by another was never observed.

5. Total average contribution of alien species to the biomass of the pelagic zooplankton depending on the season can vary from 30 to 60%. In winter and spring Boreal Arctic species dominate, in summer – Ponto Caspian species are far more abundant.

6. At present we can establish that in Saratov reservoir zooplankton assemblage combining native, Boreal Arctic and Ponto Caspian elements in its structure, is formed. Alien species are the important constitutive components of the pelagic zooplankton; their invasion is not accompanied by the depletion of biodiversity and decrease of the total biomass. In this context invasion and naturalization can be considered as part of the normal succession process in these new, very specific communities. Nevertheless further expansion of these species over the Volga reservoir cascade and their invasion in other water bodies can lead to the unpredictable consequences.

EUROPEAN ANCHOVY AND OTHER NEW FISH SPECIES IN THE WATER BODIES AROUND SAINT PETERSBURG

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Saint Petersburg is located at the mouth of a full flowing Neva river connecting Ladoga Lake and the Baltic Sea. A territory around the city is covered by dense net of rivers and lakes. Local fish fauna includes several tens of species. Most of them are anadromous or freshwater ones.

Some relatively southern species became more numerous recently: sprat *Sprattus sprattus* represent a noticeable part of catch in the Russian part of the Gulf of Finland, while 10–20 years ago it was rare; in 2010 European anchovy *Engraulis encrasicolus* was noted there (4 fishes were noted among the herrings during trawl fishing). Over last years an increase of the sabrefish *Pelecus cultratus* in numbers took place close to Saint Petersburg. 20–30 years ago it was caught sometimes in Neva bay and southern part of Ladoga, but now it is a common species in the Gulf of Finland and the whole Ladoga Lake up to the northern “skerries”, i.e. the deep, rocky inlets of the northern part of the lake. Zope *Abramis ballerus* also reached the northern part of Ladoga recently. Meanwhile the climate had not been changed significantly. It is still much colder than, for example, the climate of the typical habitats of anchovy. Some abnormally hot years took place in the past (for example in 1972), but they had not provoked invasions of southern fishes. Anchovy were caught in winter in the depth of 40 m, i.e. in cold water in the conditions which hardly changed over last decade. Similar cases were been reported for the Northern Sea: recent spreading of southern species including the deep water ones, abnormally hot years in the past which had not resulted in successful invasions. It is possible to predict the following spreading of anchovy and other southern species over whole Baltic Sea.

These cases are caused by the general tendency of any species to increase in number and to distribute as widely as possible. Now human activity facilitates such a distribution because due to fishing and overfishing the quantity of all fishes as small, both natural enemies and competitors of immigrants are not numerous.

Intentional releases represent the other source of new fish species. Sometimes even the large scale releases took place around Saint Petersburg. Specialists and amateurs released several thousands of rainbow trout *Ocorhynchus mykiss* and peled *Coregonus peled* in some lakes. Amur sleeper *Percottus glehni* is being actively distributed over small water bodies around Saint Petersburg by local fishermen. In 2011 piranha *Pygocentrus nattereri* was caught in a lake at the borderline of the city. Some of such cases were traced in details. The authors of the actions were found, and they could not explain why they released new fishes. Such an intention remind in innate instinct. In some countries a religious or other cultural base was created for it. So, in China fishes, birds and turtles are being released during special festive occasions. Such a tradition does not exist in Russia, but the instinct still exists. It evidently penetrates scientific community. Probably this very reason inspired some acclimatization project rather than scientific substantiation.

CHANGES OF "PREDATOR-PREY" RELATIONS IN THE PASVIK RIVER WATER-BODIES AFTER THE VENDACE INVASION

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Introductions and invasions of exotic species are important causes of ecological dicturbance and the translocation of fish species into new areas where they do not naturally occur has become a problem of global extent. Vendace (*Coregonus albula*) was introduced in subarctic Inari-Pasvik watershed in 1956 and 1964–1966.

After the dramatic boom in vendace population abundance in 1980's years the vendace has migrated down in Pasvik River. In the Pasvik watercourse, the outlet river system of Lake Inari, the vendace was first observed in 1989. The density increased rapidly, reaching a maximum density in 1998, but then in vendace population in the Pasvik was followed by a dramatic collaps, with a 93% decline in catch per unit effort from 1998 to 2000. In both ecosystem (Inari and Pasvik), however, a firm increase in vendace density was observed in 2004, potentially representing new booms in the populations.

We indicated the some of "phase introduction" a new species in freshwater ecosystems:

1) "latent phase" or "hide period" (slowly increasing of abundance);

2) "boom phase" (sharply increasing of abundance, sometimes indicate as "effect of acclimatization);

3) "bust period or collaps" (sharply decreasing of abundance as results of influence of predators, parasites and competitors etc.);

4) "phase of stabilization or naturalization"

We were observed the changes in the trophic level, including the changes of "predator-prey" relations during bum and bust development by invading vendace in the Pasvik watershed (1992–2008). After the invasion of new species we observed the changes in the structure of fish community:

1) vendace has become the dominant species in the pelagic zone, decrease in the contribution sparly-rakered whitefish (*Coregonus lavaretus* with 15–30 gill rakers); 2) replacement of plankton-feeding densely-rakered whitefish (with 29–40 gill rakers) from the pelagic zone to the profundal and litoral zones;

3) changes in the nets (zooplankton, shift of densely-rakered whitefish from zooplankton towards bottom animals, increasing the role of vendace in the food rations of piscivorous fish);

4) all predatory fish (brown trout – *Salmo trutta*, pike – *Esox lucius*, perch – *Perca fluviatilis* and burbot – *Lota lota*) begin to eat the vendace, and as result the part of whitefish (*Coregonus lavaretus*) in the rations of predatory fish decreasing (from 80–90% to 20–30%) and increasing a share of vendace (from 17% to 45%);

5) vendace invasion has successfully passed the arrival and establishment phase, but introduction in ecosystem is still in progress.

THE INTRODUCTION OF SOIL INVERTEBRATES IN AN EXTREME ECOSYSTEM: NON-NATIVE COLLEMBOLA IN ANTARCTIC

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In both polar and alpine environments, Collembola is among the most abundant terrestrial invertebrates. The Antarctic harbors some of the simplest faunal communities on Earth, with some areas even lacking Nematoda. True terrestrial vertebrates are absent and faunal communities consist solely of invertebrates: Diptera (two species), Acari, Collembola, Nematoda, Rotifera, Tardigrada and Protista. To date eight exotic species of living organisms are known from Antarctica (compared to 200 for the Subantarctic) (Hughes & Convey, 2010). So far, roughly 15 species of springtail have been recorded from the Antarctic continent, three of which are considered to be exotic (*Hypogastrura viatica, Folsomia candida, Protaphorura fimata*).

14 localities in the Antarctic Peninsula were sampled by us in the Antarctic summers of 2009/2010 and 2010/2011. The effect of touristic activity on soil organisms was estimated. Based on our data, the exotic state of *H.viatica* is confirmed and three additional exotic species (*Mesaphorura macrochaeta, Proisotoma minuta, Deuteraphorura cebennaria*) were recorded for the first time in the S. Shetland Islands, as well as for the maritime Antarctic in total. The highest concentration of non-native Collembola was discovered in the geothermally warmed Deception Island. Humans and geothermally heating are two factors obviously impacting the invasion of non-native Collembola in the Antarctic Peninsula.

The present work on Collembola is a part of the project "The Impact of Human Activities on Soil Organisms of the Maritime Antarctic and the Introduction of Non-Native Species in Antarctica" commissioned by the German Federal Environment Agency.

AZOLA AS AN INVASIVE SPECIES IN NORTHERN WATERS RESOURCES OF IRAN

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Azolla is a Greek root word meaning "land of death". The plant symbiosis with blue green alga called capability Nabyna molecular nitrogen air finds. The original native ferns, North America. It is a fern with small dark green and red brown leaves. Finally, the plant length of is the 5.2 cm. The plant was identified for the first time since 1873, and now the world's seven species of plants have been recorded. Azolla in symbiosis with green algae blue gets Nitrogen absorption, into the air.

Distribution of Azolla in Iran waters resources.

One of the most Algal species imported is Azolla, In late 1983, the aim of nitrogen fertilizer production for rice areas, Azolla has entered to the Iran, from the Philippines. Unfortunately, The Fern, within a short time scattered through irrigation canals and rivers over a large area of shallow water to the north of the country and especially in Gilan, Mazandaran and Golestan. The plant with tiny leaves and grow rapidly, reaching surface waters is covered and prevents sunlight and oxygen into water.

In addition, oxygen consumption, food and raising the pH of the water the environment, so that gradually weakens the diversity of plant and animal habitats will be ruined and Good living conditions and lack of natural enemies to plant became aggressive and fatal. The roots of suspended algae, absorb water and minerals to spend all or most of their is proliferation. Naturally, the light does not penetrate into the water and the nutrients that are not (or little) of the growth of other aquatic plants and other aquatic organisms such as phytoplankton and other stop or slow the growth of beneficial aquatic organisms. Instead, the system begins to make operate and anaerobic lagoon or pond regularly funky black holes and non living. Even when wetlands are drained away from aquatic organisms, it wouldn’t be a good place for migratory birds.

Fisheries experts say the growth of Azolla floats on the surface of cancer marsh wetlands and paddy fields has led most northern area of native vegetation choking the breath of life and ecosystems destroyed several thousand years. Azolla soon cover the whole of the north of the country spread on water resources (Plants Encyclopedia, 2008).The wetlands covered 90% by this plant and The annual fish fry wetlands are destroyed and are now part of the Middle East and its fisheries values of wetlands have been lost (Entezami, 2007)

GENETIC PECULIARITIES OF ALIEN POPULATIONS OF *MEDICAGO SATIVA* IN LITHUANIA

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Medicago sativa is widely grown as a protein rich fodder crop. However, an intensive cultivation of *M. sativa* in Lithuania started only in the 20th century. For the first time in Lithuania it was described in 1933 in abandoned meadows and roadsides. Due to constantly warming climate, the plants successfully overwinter, bloom and mature seeds. In Lithuania several species of the *Medicago* genus are recorded. In most European countries it has been determined that invasive *M. sativa* influences populations of native *M. falcata*, as the alfalfa grows just beside the native *M. falcata* populations. It is noted that among individuals of native *M. falcata* populations plants with different coloration of flowers, from purple, yellow and variegated flowers, are found. In most countries investigations of *M. sativa* genetic diversity are related to the selection research, in order to create new *M. sativa* varieties. Hybridization of *M. sativa* with native species of *Medicago* genus in Lithuania has not been investigated yet.

The aim of our work was to determine the genetic variability of wild *M. sativa* and native *M. falcata* populations using molecular (RAPD, ISSR) markers, to evaluate differences of *M. sativa* and *M. falcata* populations regarding the DNA and biochemical markers, to investigate ploidy level of *M. falcata* populations, to assess the possibility of wild *M. sativa* intercrossing with native *M. falcata*. The research data show that, regarding molecular markers, genetic diversity among *M. sativa* populations was significantly higher than among *M. falcata* populations. Apparently, in Lithuania wild *M. sativa* populations have originated from cultivars grown for forage or for seeds or from forage transported through the Lithuanian territory. According to enzyme polymorphism *M. sativa* populations differ from *M. falcata* populations. The majority of the investigated native *M. falcata* populations have tetraploid chromosome set, which apparently can lead to wild *M. sativa* intercrossing with native *M. falcata*. Studies have shown that wild *M. sativa* populations may affect the native populations of *M. falcata*. The possibility exists for alien *M. sativa* hybridization with native species of the *Medicago* genus, especially with yellow flowered *M. falcata*, therefore population studies of these species of the *Medicago* genus will be continued.

FOR MYCOBIOTA OF SOME INVASIVE SPECIES OF VASCULAR PLANTS IN THE KAZAKHSTAN

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Invasive species of vascular plants, took root into natural associations, frequently lead to global natural changes, caused considerable damage. Influence of every invasive species is difficultly evaluated and predicted in view of set of the parameters connected with it. Invasive species can not only compete and hybridize with native species, supersede the native species from natural phytocoenosis, simplify the structure of phytocoenosis, carry out the role of new host plants for various parasites and agents of diseases [1], but serve vector for numerous diseases, not found earlier in given territory. Researches of mycobiota of invasive species of plants with the purpose of revealing of potential agents for biocontrol for developing the effective methods for struggling with phytoinvasions in Kazakhstan were not carried out. Present materials, concerning mycobiota of *Anisantha tectorum* (L.) Nevski, *Acer negundo* L., *Conyza canadensis* (L.) Cronq., *Oenothera biennis* L., *Atriplex tatarica* L., fill this gap to some extent.

Pathogenic mycobiota of drooping brome (*A. tectorum*), wide spread in the whole territory of the Kazakhstan, numbers 6 species of fungi: *Puccinia graminis* Pers. (agent of leaf rust), *P. recondita* Dietel & Holw. (agent of steam rust), *Ustilago bullata Berk.* (brome smut fungus), *Septoria bromi* Sacc. and *Macrosporium utile* Kellerm. & Swingle (agents of foliar blotches) and *Blumeria graminis* (DC.) Speer (powdery mildew fungus). Among them *U. bullata,* infecting ovaries of host plants, is the most harmful. All the rest above mentioned fungal species cause leaf dying off untimely, reduction of photosynthesizing surface and depression of plants consequently.

On invasive species of box elder (*A. negundo*) in the Kazakhstan parasitize 10 fungal species. Wound parasite, *Polyporus squamosus* (Huds.) Fr., causes white decay of heart wood of *A. negundo* trunk. Dead branches and bark are occupied with *Dotiorella negundinis* Ellis & Barthol., *Cytospora pseudoplatani* Sacc., *Cryptodiaporthe hystrix* (Tode) Petr. (=*Septomyxa negundinis* Allesch.), *Nectria cinnabarina* (Tode) Fr. (=*Tubercularia confluens* Pers.), *T. granulata* Pers. Species of genera *Cytospora* and *Tubercularia* can be reason of wither and destruction of individual branches of host plant. Powdery mildew infection of box elder leaves (*Sawadaea bicornis* (Wallr.: Fr.) Homma) is observed every year in most regions of the Kazakhstan. Foliar blotches of *A. negundo* are caused with *Cladosporium epiphyllum* (Pers.) Nees, *Coniothyrium negundinis* Tehon & E.Y. Daniels and *Rhytisma acerinum* (Pers.) Fr.

Three species of fungi, causing powdery mildew (*Sphaerotheca fusca* (Fr.) Blumer) and leaf spots (*Septoria erigerontis* Peck and *Ramularia erigerontis* Gonz. Frag.), are found on Canadian fleabane (*C. canadensis*). There is not intensive development of these diseases in the territory of the Kazakhstan.

On leaves of garden evening primrose (*O. biennis*) only powdery mildew fungus *Erysiphe howeana* U.Braun is found, which is observed only on conidial stage. Symptoms of infection appear in the end of summer, harmful of diseases is not considerable.

Pathogenic mycobiota of Tartar orache (*A. tatarica*) numbers 4 species: *Leveillula cylindrospora* U.Braun, causing powdery mildew of Tartar orache in south regions of the Kazakhstan, as well as *Stagonospora atriplicis* (Westend.) Lind (=*Phoma atriplicina* Westend.), *Diplodia herbarum* (Corda) Lev. and *Passalora dubia* (Riess) U. Braun (=*Cercospora dubia* (Riess) G. Winter), causing foliar blotches of various kinds.

DEVELOPMENT OF THE RANGE OF THE INVASIVE FISH *PERCCOTTUS GLENII* IN EUROPE AND ITS IMPACT ON FRESHWATER ECOSYSTEMS

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The alien fish rotan, or Amur sleeper, *Perccottus glenii* (Perciformes, Odontobutidae), originates from the Far East of Eurasia. Presently, this species is widely distributed outside its native range. Non native distribution of this invader covers great areas in northern Eurasia including territories of 14 European countries. The expansion of this species covered great areas in northern part of Eurasia including territories of 14 European countries. There were several initial introductions of this species in Europe risen in several centers of secondary distribution lead to appearance of separate new parts of the invaded range. One of such initial introduction happened in Western Ukraine during the stocking of commercial cyprinid fish. The West Ukrainian centre of distribution of this fish species consists of two contiguous areas: Lviv and Zakarpatie, separated by the Carpathian Mountains. Three periods were identified in the discussed expansion. Period I was during two decades post arrival; the first was restricted to the upper section of a local river basin. Period II: rotan penetrated to the adjacent river basins and over the following two decades, it rapidly colonized huge territories, using rivers as long distance, one way natural corridors. This expansion resulted in the invasion of many European river systems including the Danube, Dniester, western part of the Dnieper basin, Southern Bug (all belonging to Black Sea basin), and the Vistula (Baltic Sea basin). During colonization, rotan was found in seven provinces of Western Ukraine, as well as in territories of south western Belarus, Poland, Slovakia, Hungary, Serbia, Bulgaria, Romania, Croatia, and Moldova. The example of dynamics of the West Ukrainian centre of secondary distribution highlights the significance of upper parts of river basins for comparatively rapid distribution of this species, as well as the important function of rivers in crossing country borders. Period III began from approx. 2005. This will be the longest period of filling the gaps in areas between previously colonized rivers. This alien species formed numerous dense populations in shallow lentic water bodies. The expansion of rotan may lead to adverse economic impact as well as to predictable ecological consequences for populations of some native European aquatic animals including invertebrates and lower vertebrates. Rotan has the potential to also influence adjacent terrestrial ecosystems. Interactions between rotan and native invertebrates, fish, amphibians, reptiles, birds and mammals are reviewed in this presentation.

ESTABLISH OF THE PONTO CASPIAAN CYCLOPS *PARAEGASILUS RYLOVI* MARKEWITSCH, 1937 (COPEPODA, CYCLOPOIDA, ERGASILIDAE) IN THE LADOGA LAKE

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The Ponto Caspian cyclops *Paraegasilus rylovi* Markewitsch, 1937 (Copepoda, Cyclopoida, Ergasilidae)) was first recorded in the Volchov Bank in the zooplankton samples collected in July of 2011 and 2012. Most likely, *P. rylovi* invaded the lake Ladoga in the beginning 2000 th from the Caspian Sea via the Volga–Baltic waterway with the ballast waters of ships. *P. rylovi* were rare in the plankton of Volchov Bank, occurring in less than 0.1%. But one can suppose the further successful expansion of *P. rylovi* over the south part of Ladoga lake.

EFFECTS OF RELEASING GOLDFISH (C*ARASSIUS AURATUS*) IN INLAND WATERS OF IRAN

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Since keeping Goldfish (C*arassius auratus*) in Iran during the first 13 days of spring season (20th of March 1th of April) has been an ancient custom, then ornamental aqua culturists have been providing Goldfish in this matter and launching marketing one month prior to solar new year which is coincides with 20th of March. Gold fish are kept for 13 days in the beginning of spring by buyers and on the 13th day that has been named as Nature day in Iran, are released to the rivers around cities as a custom as well. According to the 75million population of Iran revealed in 2012 (official statiscal data of 2012), in average every family in Iran has 4 people and each family buys 2 fish so 37 million Goldfish have been estimated to be purchased during this short time. About 1/20 of purchased fish are released to the rivers around cities which cause rivers ecosystem problems. Knowing that most of freshwater fishes are belong to Cyprinidae family, food competition among this family can become a serious problem. Also introducing new pathogens to the rivers ecosystem by releasing Goldfish including *Argulus, Lernea, Dactylogyrus* sp., *Gyroductylus* sp., *Ich, Aeromonas* sp., *Saprolegnia* and *SVCV* infestations arise from it. Because literature review shows that this fish have these infestations that can be new for new ecosystems. Therefore releasing ornamental fishes like Goldfish in Iran without having the sufficient knowledge of its consequences will be harmful for rivers ecosystems.

ALIEN SPECIES OF HYDROBIONTS AS A FACTOR OF REORGANIZATION OF THE ECOSYSTEM OF SARATOV RESERVOIR

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During the last decade Ponto Caspian alien species have greatly expanded in the Saratov reservoir ecosystem. For instance, this species complex is represented in zooplankton by 5 species (Popov, 2008; Popov, Mukhortova, 2008), in benthic (macrobenthos, nectobenthos) assemblages by 24 species (Kurina, Zinchenko, 2010), there are also 5 alien species of fishes (Evlanov et al., 1998). The main problem yet to be solved is how these invasions affected the functioning of the reservoir ecosystem.

In order to analyze transformations occurring in the Saratov Reservoir ecosystem, we used the data on the infestation rate of fishes by parasites with complex life cycles. Their inflow in the host population is connected with the host feeding, thus we used the parasite as a biological marker reflecting the ecology of the host.

It is established that parasitofauna of the alien species of fishes is composed of native and alien species of parasites. Caspian Sea sprat is the only species that has not carried new parasite species in this water body.

It is revealed that alien fishes are actively entering the food chains, which were transformed due to the invasion of the alien species of the zooplankton and zoobenthos. The role of the particular alien species of fishes in the realization of the parasite life cycles can vary considerably. For instance they can:

- Determine the elimination of the specific development stages of the native parasite species;
- Conduct the invasion of the new (alien) parasite species, which use zooplankton and zoobenthos organisms for their development;
- Include themselves in the life cycles of the native parasites, apparently providing the food competition for the native species of fishes.

Inclusion of the Ponto Caspian species of fishes in the food chains determines not only transformation of the core of the multispecies helminth association, but changes in its structure as well, especially for the predatory fishes, which are characterized by the longest food chains. Changes of dominance in the multispecies helminth association of the perch (*Camallanus truncatus* over *C. lacustris*), replacement of certain species of parasites by another for the pike (*Triaenophorus nodulosus* by *T. crassus*) are the sign events of the deep structural and functional transformation in the ecosystem of Saratov Reservoir. It indicates that alien hydrobyonts not only successfully entered the food chains, but significantly transformed them.

We should mention that changes in the fauna of fish parasites responded to transformation of the Saratov Reservoir ecosystem after a certain delay, because the process of the food chains transformation was not a single staged event, but took a certain period of time.

ANALYSIS OF PLANT COMMUNITIES OF *ERIGERON CANADENSIS* L., *SOLIDAGO CANADENSIS* L. S.L. AND *HELIANTHUS TUBEROSUS* L. WITHIN THE TERRITORY OF DAUGAVPILS CITY (LATVIA)

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Rates of distribution of alien plant species have increased rapidly in recent decades. In the future this trend could intensify, in relation to traffic intensification, the grow of tourism sector and climate change (Borisova, 2010). Plant communities have different susceptibility to alien plant species. As the reason for the different susceptibility it is referred that many plant communities have no intensive competition and become more unstable. This increases the threat of alien species entering (Davis et al., 2000; Laiviņš, 1998). Description and systematization of plant communities in Latvia began in the 70 ties of 20th century using the Braun Blanquet method, widely used in phytosociology studies in Europa (Jermacāne, Laiviņš, 2001).

Research area is located in Daugavpils, in the south eastern part of Latvia (55°52′30″N 26°32′8″E). The Daugavpils is the second largest city in Latvia with 92 533 inhabitants (CSB, 2012) and covers an area of 72.48 km^2. At national level Daugavpils is an important railway transport node (Spatial plan of Daugavpils for 2006–2018). The territory was mapped in regular grid (500 × 500 m). The total number of quadrants was 344.

Plant communities of three alien species in 42 plots were analyzed using Braun Blanquet method, to evaluate alien species distribution and impacts on natural plant communities. The geographic origins of all taxa is North America and all of them are invasive plants in Daugavpils (NOBANIS, 2013; Priedītis, 2013).

Eigeron canadensis L. – common in the whole territory of Latvia (Priedītis, 2013). It is adapted to a wide range of growing conditions found, in dry pine forests close to towns, motor roads and railway edges (Weaver, 2001), in disturbed areas and is particularly well suited to conditions prevailing in agricultural fields (Regehr, Bazzaz, 1979; Priedītis, 2013). It was found in 278 squares (2144 records), most often along the roads and the railways, also in dry pastures and weedlands.

Solidago canadensis L.s.l. spread very quickly and occurs over a wide range tipes of soil (Weber 2000). Habitats: small, locally dense groups in weedlands, along the railways, in dumps and dry forests (Priedītis, 2013). In the territory of Daugavpils taxa was identified in 151 squares (557 records).

Helianthus tuberosus L. usually forms dense stands or groups in weedlands, dumps and along railways (Priedītis, 2013). It was found in 134 squares (334 records) in the Daugavpils city.

Wide stands of *Erigeron canadensis, Solidago canadensis* and *Helianthus tuberosus* were found in research, mainly along the roads and allotment areas. All investigated taxa have a poor plant communities, and in the case of *S. canadensis* and *H. tuberosus* – monodominant stands.

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ICHTHYOFAUNA OF THE RIVER AKSU OF BALKHASH BASIN

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Being one of the main rivers of Seven Rivers flowing into Lake Balkash, Aksu River originates in the glaciers of Jungar Alatau. The Major tributary of the Aksu in 20 km downstream is river Sarkand.

The study of fish fauna of the river Aksu began by N. Serov in 1953–58 years. The following studies of species diversity were done by S. Timirhanov and O. Shcherbakov (1999).

The aim of the study was to investigate the current status of fish fauna of the Aksu River and its tributary Sarkand. The studies were conducted in 2011 and 2012. Landing net and fry dragnet 15 m long used for fishing. Long small fishes was fixed in 4% formalin solution, further processing is carried out in the laboratory. Big fishes were examined in the field at once. Morphological and biological analysis was performed according to standards of ichthyological procedure (Pravdin, 1966).

Our results show that a modern fish fauna of the Aksu river is represented by following species of fish: native – Eurasian minnow *Phoxinus phoxinus*, Balkash minnow ***Rhynchocypris poljakowii***, spotted thicklip loach ***Triplophysa strauchii***, gray loach ***T.dorsalis***, Balkash perch ***Perca schrenkii***, naked osman ***Gymnodiptychus (Diptychus) dybowskii***, alien – asp ***Aspius aspius***, common carp ***Cyprinus carpio***, roach ***Rutilus rutilus***, freshwater bream ***Abramis brama***, wels catfish ***Silurus glanis***, pike perch Z***ander lucioperca***, stone moroco ***Pseudorasbora parva***, prussian carp ***Carassius gibelio***, golden gudgeon ***Hypseleotris cintus***, Chinese false gudgeon ***Abbotina rivularis***.

Variety of fish fauna of Sarkand River is also represented by indigenous and alien fish species. There are also Tibet stone loach ***Triplophysa stoliczkai***, plain thicklip loach T. labiata, Severtsov's loach T. sewerzowi. We did not find freshwater bream, asp, roach, perch, wels catfish.

Comparative analysis of the diversity of the Aksu River with data S. Timirhanov and O. Shcherbakov revealed significant changes in 20 years. We have not discovered previously conventional and dominated in different periods Balkhash marinka *Schizothorax argentatus argentatus* and Ili marinka *Schizothorax argentatus pseudaksaiensis*. According to these authors if before marinka remained in the river due to isolation from the mainstream of acclimatized, and now they become rare or even disappeared. As a result of amateur barbarian fishing (Timirhanov, 1999) and changes in the hydrological regime entailed resettlement of alien fish species Balkash perch occurs sporadically. Under current conditions in the fish fauna of the river is dominated by roach, asp and Chinese false gudgeon. In our catches of roach length ranged from 36.4 mm to 111.3 mm (58.4±1.9), asp from 49.6 to 71.6 (58.8±1.8), Chinese false gudgeon from 23.4 to 59.7 (34.2±1.9). The zone of native species decreased significantly. They were found by us near the village Zhansugurov, in areas with a swift current and rocky bottom. In our catches of native fish fauna there are lots of naked osman length, which ranged from 23.3 to 150 mm, 8 mm (60.6±3.2), spotted thicklip loach from 20.4 mm to 78.5 mm (36.7±2.8) and other species in small quantities.

Significant number has now reached the Chinese false gudgeon, which is 20 years ago was totally absent in the fish fauna of the river. The body length of river in our samples Chinese false gudgeon changed from 23.4 mm to 60 mm (34.2±2).

Ichthyofauna of Sarkand River became richer than the earlier data, which was presented only by the naked osman and Tibet stone loach.

DISTRIBUTION OF INDIGENOUS AND INVASION FISHES IN DALAMAN RIVER IN THE MEDITERRENEAN REGION (MUGLA – TURKEY)

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Dalaman River is located in the Western Mediterrenean Basin, Turkey. This river has 3 small dam lakes, two of them have Hyro electric Power Station. In the basin, there are many threats caused pollution of agricultural and tourism activities, fishing pressure, habitat degradation, over abstraction of water and barriers. This study was carried out to determine native and non native fish fauna in This River Basin in southern part of Turkey. Also, in two dam lakes have fisheries and aquaculture activities. In this study, specimens which were caught by scoop net and gill nets were examined between January, 2012 and February, 2013. As a result of the study, it was identified that Dalaman River has species of *Cyprinus carpio*, *Squalius cephalus*, *Barbus plebejus escherichi*, *Alburnus* sp., *Capoeta bergamae*, *Petroleuciscus smyrneaus*, *Vimba vimba*, *Anguilla Anguilla, Gambusia affinis*. Also, exotic fish were determined to be *Tilapia zillii* and *Carassius gibelio.* These introduction of exotic fish were made by restocking activities in reservoirs accidentally or deliberately. In Dalaman river, *Petroleuciscus smyrneaus* and *Capoeta bergamae* are vulnerable fishes in the Southern part of Anatolia. Many freshwater ecosystems have been facing up many problems resulting from introduction of non native species for management strategies.

CENCHRUS LONGISPINUS INVASION IN S RUSSIA AND UKRAINE: A PRELIMINARY ANALYSES OF MOLECULAR DATA

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Cenchrus longispinus is an alien north American annual grass potentially hazardous to agriculture of S Russia. Its noxiousness is determined by the peculiarities of its morphology and ecology. The plants possess spikelets surrounded by burry bracts, able to cause serious injuries to humans and animals. The plants can distribute to new habitats with their burry involucres containing seeds, which readily adhere to clothes, wool, car tires, or may be carried with hay or spring waters. This grass can rapidly spread in sandy areas as a weed in melon and corn fields, diminishing yield by root competition and allelopathic interactions. Seeds can grow the next year after sowing, but some of them get into true dormancy, staying alive for the next 3-5 years. These peculiar traits make *C. longispinus* a noxious weed able to cause huge economic loss in the case of its wide naturalization. This threat may be even greater due to the existing problems in taxonomy and nomenclature of the genus *Cenchrus*. It appears that the species listed in the phytoquarantine list in Russian Federation is called *C. pauciflorus*, however, it is known under the name *C. longispinus* in Ukraine, where it is actively spreading now. At the same time, in the European and Mediterranean Plant Protection Organization list a third name *C. incertus* appears. A preliminary analysis of available herbarium collections indicates, that *C. longispinus* is the particular invasive species in Ukraine and Russia, which is the northernmost distributed taxon of the group in its natural area in N America. Analyses of morphological character variability and ISSR marker polymorphisms in populations of natural (N America) and secondary (S and E Europe) parts of its area enable to assess the breeding systems and reveal high probability of apomixis and/or selfing. The material used in the study includes both extensive samples from contemporary populations and herbarium collections of various collectors from the same localities made in the past. In combination with the analyses of DNA polymorphisms of seed progeny of particular maternal plants, the data enable to assess heritability of markers, the size of apomictic clones/selfed lineages, the dynamics of their geographical spreading and the probable number of introductions.

ALIEN SPECIES AT COASTAL WATERS OF THE NORTHEASTERN BLACK SEA

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A total of 67 alien species were recorded in coastal waters of the northeastern shelf of the Black Sea in last years (45 Copepoda, 2 Polychaeta, 5 Tintinnida, 6 Bacillariophyceae, 8 Dinophyceae, 1 Prymnesiophyceae). The largest number of alien species was recorded in the Novorossiyk Bay (55), port of Tuapse – 22, Snake Lake Liman (Bolshoi Utrish) – 16 (6 – Copepoda, 2 – Polychaeta, 5 – Tintinnida, 2 – Bacillariophyceae, 1 – Dinophyceae). Snake Lake Liman is located in 24 km to the northwest from oil terminal "KTK R" settlement Yuzhnaya Ozereevka. In consequence of special physiographic and ecologic conditions this basin may be a basin recipient for successful naturalisation of alien species. In the port areas of Novorossiysk, Tuapse and Snake Lake Liman we registered same complex of alien species. Numerical density of alien species of cyclopoid copepods *Oithona davisae* reached in September 2010 in Liman the maximum values of density for the northeaster shelf – $27.6 \cdot 10^3$ ind./m^3 (Selifonova, 2011). Three new species of spionid polychaetes have been revealed in muddy sediments, one of which ***Streblospio gynobranchiata*** is recently introduced in ports of Crimea and Caucasus with ships'ballast waters (Radashevsky, Selifonova, 2013). Numerical density of alien species of infusoria tintinnids ***Tintinnopsis tocantinensis*** reached $2.1 \cdot 10^6$ ind./m^3, ***T.directa*** – $1.3 \cdot 10^6$ ind./m^3, ***Amphorellopsis acuta*** – $0.5 \cdot 10^6$ ind./m^3, ***Eutintinnius tubulosus*** – $0.4 \cdot 10^3$ ind./m^3, ***Salpingella*** sp. – $0.4 \cdot 10^3$ ind./m^3. The average density of non indigenous infusorians was in 2–8 times above than in the port of Novorossiysk. The status of invasive species define to such indirect indications, as revealing of an alien species in port water with corresponding gradients of environment, the presence of free ecological niches, low competition of native species, mass development of alien species and ability of these organisms to exist under various conditions. Majority stenohaline species perishes because cannot overcome gradient of increase of salinity. Only tolerant species to considerable fluctuations of salinity can successfully overcome the change of osmotic pressure and ionic concentration. Solitary findings of a large number of alien species of Copepoda (44 taxonomic forms), whose ranges of distribution are limited by poly and euhaline waters, should be considered doubtful. However, in a new environment with optimum conditions, an ecological "outbreak of abundance" of alien species may happen, as it was observed in the case with cyclopoid copepods ***Oithona davisae***, infusoria tintinnids ***Eutintinnus lususundae***, ***Tintinnopsis directa***, ***T. tocantinensis***, ***Amphorellopsis acuta***, polychaetes ***Streblospio gynobranchiata***. Let's especially note cyclopoid copepods ***O. davisae*** which is characterised by high tolerance to decrease of salinity. It allows a species to survive in estuaries and brackish water, including in sea of Azov (Selifonova, 2011). Establishment of ***O. davisae*** in the Black Sea – an example favorable invasion, when the alien species occupies a vacant ecological niche in the basin recipient. Increase of number of anthropogenous ecosystem recipient of bioinvasion like Snake Lake Liman and intensification of dump of ships'water ballast can accord the impact on biodiversity and productivity of coastal waters of the northeastern Black Sea.

NON NATIVE MACROINVERTEBRATES AND FISHES OF THE DNIEPER RIVER BASIN

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The goal of present study was to obtain a new data on composition and distribution of alien species (macroinvertebrates and fish) in the Dnieper river basin for evaluation of pathways, origin of species, and rate of spread and creation of "black" list. The base for analysis were own and published data for studied area.

The Dnieper River basin was divided on different units from downstream to upstream for estimation of differences on alien species diversity and pathways. The 56 alien macroinvertebrates and 32 species of fish are founded in the Dnieper River basin now. As expected more than 50% of alien species have Ponto Caspian origin, but as opposed to invertebrates many fish has the Asian origin.

Some species pointed out on all units and they have the high abundance (gammarids and gobiids). These species can be characterized as the most successful invaiders.

The main factors that facilitated of spread of alien Ponto Caspian fauna in the basin were construction different reservoirs in middle and low part of course and canals. But appearance of exotic species (mainly Atlantic origin) is not related with hydrological transformation of river basin.

The main pathway of spread alien fauna for studied units is differing. For middle course of the Dnieper River (Zaporozhye, Dneprodzierzhinsk, Kremenchug, Kanev and Kiev reservoirs) it is intentional introduction whereas for upstream are shipping (invertebrates) and natural spread (fish).

We calculate the rate of spread for some alien species on the basis first records data. For gobiids its values vary within 10 km/year (round goby) to 600 km/year (tubenose goby) and for gammarids it value was at the average 10 km/year.

The "black" list includes 12 macroinvertebrates and 7 fish and the 40% of these species is not Ponto Caspian.

The high risk of new invasion pointed out for Dnieper Bug liman and upstream (Prypiat River and Dnieper Bug canal). In first case it related with ballast waters, in second case – with shipping (ship fouling). The negative aspect of colonization Dnieper' reservoirs consist not only in local ecological impacts but with the risk of further expansion to new regions via different canals and irrigation systems.

INVASIVE SPECIES CERCOPAGIS PENGOI (OSTROUMOV, 1891) AND EVADNE ANONYX GO SARS, 1897 AND THEIR INFLUENCE ON THE STRUCTURE AND FUNCTIONING OF THE ZOOPLANKTON COMMUNITIES IN SOUTH EASTERN PART OF THE BALTIC SEA

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Cercopagis pengoi and *Evadne anonyx* are endemic Caspian (River, 1998) and entered the Gulf of Finland in the 90 ies of XX century, and then spread across the Baltic Sea, the main vector of introduction of these species – shipping (Panov et al., 2007). According to our and literature date *Cercopagis pengoi* was first detected in the south eastern part of the Baltic Sea in 1999, *Evadne anonyx* – in 2007, information on the status of the populations of these species in the region in the modern period are virtually absent.

The aim of our research was to study the quantitative development, spatial distribution and effects on the structure and functioning of the planktonic communities of invasive species *Cercopagis pengoi* and *Evadne anonyx*.

The material for our research were the zooplankton samples that were collected in the south eastern part of the Baltic Sea, from 1999 to the present, as well as samples of zooplankton, which were collected in the Curonian and Vistula Lagoon of the Baltic Sea from 2007 to present time.

Cercopagis pengoi and *Evadne anonyx* are thermophilic and therefore were noted only in the summer and autumn, with a maximum reach in the summer in July and August, when there was maximum warming waters of the Baltic Sea and the Lagoons. *Cercopagis pengoi* was found in the south eastern part of the Baltic Sea and the Curonian and Vistula lagoons, but this species successfully naturalized only in the Baltic Sea and in the Vistula Lagoon. *Evadne anonyx* was recorded in the south eastern part of the Baltic Sea and in the Vistula Lagoon, in which it can be successful naturalize.

In the years of maximum development of invasive species *Cercopagis pengoi* and *Evadne anonyx* they can significantly reduce nutritive base fish planktophagous, consuming a significant part of the zooplankton production. So in 2010, when these species reached its maximum development in the south eastern part of the Baltic Sea, they can consume up to 40–90% of the production of the filter feeding zooplankton. Especially important the larger crayfish *Cercopagis pengoi*, which consumes most of the production of the filter feeding zooplankton. *Evadne anonyx* value in the ecosystem south eastern Baltic Sea is not so much, its abundance and biomass is not large compared to the native species *Evadne nordmanni* Lovén, 1836, however, according to some authors, the fertility of *Evadne nordmanni* significantly lower than that *Evadne anonyx* (Pollupuu et.al., 2008), and therefore there is a threat to indigenous species in years with high average summer temperature. In the Vistula Lagoon of the Baltic Sea in 2010 *Cercopagis pengoi* in summer also consume a significant part of production, in some periods diet of *Cercopagis pengoi* exceeded production the filter feeding zooplankton, which greatly undermined the food base of fish planktophagous and juvenile fish.

Thus, invasive species *Cercopagis pengoi* and *Evadne anonyx* successfully naturalized in the south eastern part of the Baltic Sea and may have a significant impact on the structure and functioning of the planktonic communities of the investigated region. One of the key factors influencing the quantitative indicators of invasive species is the temperature. Therefore, under conditions of extremely warm summer of 2010, they reached their maximum development in the study area. At the same food base fish planktophagous and juvenile fish as the Baltic Sea, and the Vistula Lagoon in the period of maximum development these invasive species was largely undermined.

IMPACT OF INVASIVE SPECIES *RANGIA CUNEATA* (SOWERBY I, 1832) ON THE PLANKTON COMMUNITY OF THE VISTULA LAGOON (BALTIC SEA)

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North American brackish water bivalve ***Rangia cuneata*** (GB Sowerby I, 1831), was first recorded in the Vistula Lagoon of the Baltic Sea in September 2010. In 2010–2011. R. cuneata already colonized and populated the widespread areas of the Lagoon (Rudinskaya, Gusev, 2012). Top down effect of the mollusk with the filtering type of food on the plankton community Vistula Lagoon is still unclear. The aim of this study was to investigate the changes in communities of phytoplankton and zooplankton occurred after invasion Rangia cuneata in the Vistula Lagoon.

The material for this study is based on samples of phytoplankton and zooplankton, which were selected during the vegetation season from April to November period 2008–2012 at 5–9 stations on Russian territorial waters of the Vistula Lagoon. The entire study period can be divided into 3 stages. First stage was in 2008–2009 – ***Rangia cuneata*** allegedly moved into the Vistula Lagoon, but the quantitative characteristics of Rangia cuneata development was low, which did not allow to detect this species in the macrozoobenthos. At this time the invader, apparently, had no significant effect on the plankton community of the Lagoon. Second stage was in 2010 – *Rangia cuneata* was found in the Lagoon and had large abundance and biomass in a limited area. Third stage was in 2011–2012 – ***Rangia cuneata*** naturalized and increasing their abundance and biomass actively spread in the Lagoon.

The possible impact of the invader on the phytoplankton community was reflected in the change of its structure, so in summer 2010–2012 compared to the same period of 2008–2009 there was a sharp decline in the proportion of green algae from 20–36% to 5–13%. In the summer of 2011–2012 compared to the summer period 2008–2010 decreased the proportion of diatoms from 17–57% to 5–16% of the biomass of phytoplankton. In 2011–2012 dramatically increased the proportion of blue green algae from 32–61% to 69–87% of the total biomass. Apparently, such a fundamental change in the relationship department of phytoplankton in the summer, the time of maximum filtration activity of bivalvia ***Rangia cuneata***, occurred as a result of selective grazing of this kind more valuable nutritionally green algae and diatoms, resulting in a blue green algae to gain a competitive advantage for their development.

The possible impact of the invader on the zooplankton community was reflected in the change of its structure, so in the summer in zooplankton larvae *Rangia cuneata* appeared, the abundance of which has increased from 190–403 sp./m^3 in 2008–2010 to 2315–21820 sp./m^3 in 2011–2012. Being in the plankton, along with other zooplankton, they can be to compete with them. In zooplankton observed change in the ratio of main taxonomic groups. During the summer period 2010–2012 increased share of rotifers at 1.6–5.3 times of abundance and biomass of zooplankton and 1.2–2.6 times reduced the proportion of cladocerans and copepods. However, in contrast from phytoplankton to the zooplankton can not be unambiguously suggest that the ratio between taxonomic groups was caused only *Rangia cuneata*, as at the zooplankton community of the Vistula Lagoon and great influence of another invasive species of plankton Cercopagis pengoi, which selectively eats away crustaceans, which may also leads to an increase in the proportion of rotifers. In connection with this, apparently, there is a joint effect of two types of invasive species on the zooplankton community. Therefore, impact of the bivalve Rangia cuneata changed the plankton community of Vistula Lagoon. The influence was reflected in the change in the ratio of taxonomic groups of phyto and zooplankton and the appearance in the plankton community larvae *Rangia cuneata*, which can complicate the competitive relationship. According to the ratio of taxonomic groups of phyto and zooplankton Vistula Lagoon in 2011–2012 can be attributed to a reservoir at a higher trophic status, compared with 2008–2010 years.

INVASIVE SPECIES IN THE FLORA OF SAMARA UL'YANOVSK VOLGA REGION

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At present, native florists are observed to make active researches of invasive species. Special attention is paid to biology and ecology of invasive plants, edition of the «Black Books of Flora» is intensified (Vinogradova et al., 2009, 2011; Grigor′evskaya et al., 2013).

Common features for invasive species are the follows (Richardson et al., 2000; Carlton 2001; Pyšek et al., 2004; Gel'tman, 2003, 2006; Vinogradova et al., 2009): distribution beyond their primary areas; naturalization in natural and semi natural communities, i.e. overcoming of the barrier associated with distribution of diasporas (spores, seeds, fruits and their parts, vegetative organs and their parts); as a rule, formation of offspring in a very large number; often, negative impact associated with transformation of natural ecosystems and their functioning, as well as with threat for individual plant species and public health, economic or environmental harm.

For to identify the species composition of invasive species in the flora of Samara Ul'yanovsk Volga region and to make their further categorization we use the following criteria: character of habitats (natural, semi natural, disturbed); activity; interaction with native species.

Native researchers, also, use the scale focused on assessing of aggressiveness level of invasive plants and their propagation characteristics (Notov et al., 2010).

By using these criteria the following groups of species may be distinguished:

1. Intruded in natural habitats, affecting coenotic ties in a community, changing its appearance, displacing native species, often forming single species thickets (so called «Transformers»).

2. Intruded in semi natural or natural communities but not displacing native species and not forming single species thickets.

3. Actively naturalized on disturbed habitats.

In total, 31 invasive species are counted in the flora of Samara Ul'yanovsk Volga region, that is 6.5% of the total number of alien species (Rakov et al., 2011).

The first group includes five species: *Acer negundo* L., *Bidens frondosa* L., *Echinocystis lobata* (Michx.) Torr. et Gray, *Elaeagnus angustifolia* L., *Elodea canadensis* Michx.

The second one – 7: *Aster × salignus* Willd., *Epilobium ciliatum* Rafin., *E. pseudorubescens* A. Skvorts., *Impatiens parviflora* DC., *Parthenocissus quinquefolia* (L.) Planch., *Phragmites altissimus* (Benth.) Nabille, *Typha laxmannii* Lepech.

The third one – 19: *Acroptilon repens* (L.) DC., *Amaranthus albus* L., *A. retroflexus* L., *Ambrosia trifida* L., *Atriplex tatarica* L., *Cardaria draba* (L.) Desv., *Conyza canadensis* (L.) Cronq., *Cuscuta campestris* Yunck., *Cyclachaena xanthiifolia* (Nutt.) Fresen., *Fraxinus pensylvanica* Marsh., *Heracleum sosnowskyi* Manden., *Hippophaё rhamnoides* L., *Hordeum jubatum* L., *Lepidium densiflorum* Schrad., *Lepidotheca suaveolens* (Pursh) Nutt., *Oenothera biennis* L., *Phalacroloma annuum* (L.) Dumort., *Solidago canadensis* L., *Thladiantha dubia* Bunge.

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MODERN COMPOSITION OF ALIEN FISH SPECIES KUYBUSHEV RESERVOIR AND THE POSSIBILITY OF PENETRATION OF NEW MEMBERS INTO THE ECOSYSTEM OF THE RESERVOIR

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Before the regulation of the river (1955–1957) In the Middle Volga, in the future of the Kuybyshev reservoir, had met 50 species of fish (Kuznetsov, 1978). Now in the fish fauna of the reservoir is marked 58 fish species, 17 species (29.3%) are invaders, which were appearing here at different times and with different ways. We do not take into account the species, that did not find in the reservoir (Caspian lamprey, Russian sturgeon, bastard sturgeon, Caspian Sea shad, and others, despite the fact that they had previously lived here) at the recent time and the species (smallmouth, bigmouth and black buffalo, *Coregonus lavaretus baunti*, etc.), about which there is no information today.

In the spread of invasive species in the Volga, including the Kuybyshev reservoir, by the researchers (Koreneva, 2003, 2005; Shakirova et al., 2006, etc.) are allocated in two periods: 60 years of the twentieth century, coinciding with completion of the main hydro building of pool and 80-s which are connected with increasing of level of water in the Caspian Sea, which began in 1978. The spread of invasive species, especially members of the family Gobiidae, were happened so fast so at the end of the 80-s in the Volga and the Don, it assumed the character of the mass expansion (Slynko et al., 2010; Galanin, 2012).

Thus, to increase the composition of invasive species of the Kuybyshev reservoir contributed spontaneous penetration of alien species in the reservoir, which penetrated from the north and from the south, acclimatization activities in the pond in the 50–70 years of the last century (silver carp, bighead carp, grass carp, peled, *Coregonus lavaretus baunti*, lake chud whitefish), cage farming of fish (rainbow trout), and others. Some invasive species (kilka) are fully naturalized, breed, widely distributed and using by fishing, others – multiply themselves and become common species with local distribution (shore pipefish, Amur sleeper, round goby, stellate tabpole-goby). In the reservoir also observed the invasive species which had not naturalized (grass carp, silver and bighead carp), the number of which is maintained and controlled by the amount of the issue.

The process of formation of the ichthyofauna of the Kuibyshev reservoir continues. From the lower reservoir (Saratov and Volgograd) to Kuybyshev can penetrate vimba, today their numbers build up, black carp, smallmouth buffalo, whose production is expected in both reservoirs. It's probably the entry of several Gobies from the Caspian Sea into the Kuybyshev reservoir, which are meeting in the Volga delta and the lower portions today.

We should expect changes in the species composition of the fish fauna after completion in 2015, construction of a new cargo port *SMMLTS (Sviazhsky multimodal logistics center) which is located at the intersection of the international transport corridor "North-South" and "East-West", which in future will be the center of the transport of goods "river-sea" in the Volga region.

ALIEN MAMMALS OF MONGOLIA

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Studying of influence invasive species on structure and function of ecosystem is one of the hottest problems of modern ecology. Since XX centuries in many parts of the world have occurred the essential ecological variations connected with penetration in natural and artificial ecosystem not peculiar for them of invasive species of animals from other regions. Invasive species, having got in new ecosystem, in some cases have jeopardized a security of existence and stability of progress of the whole regions.

The basic ways of their penetration in native ecosystem the following: (i) the natural movings induced by fluctuations of populations and climatic variations; (ii) the intentional movement of species (introduction and reintroduction) for utilitarian purposes; (iii) accidental movements with ballast waters or import agricultural products. But, now it is difficult to define what of these versions prevailed at formation of modern "shape" of the animal population in many countries (Chashchukhin, 2007; Genovesi et.al., 2012).

For Mongolia a invasive species definitely is the muskrat (*Ondatra zibethicus*). It has got on territory of Mongolia a natural course in 1967 year, via river Selenge. Later the Mongolian experts have acclimatized the muskrat in Lake Har-Us (Western Mongolia). The first party has consisted of 50 individuals. Nowadays number of a type is exceeded significantly with 40 thousand individuals, and its area significantly has extended. Under oral messages of local residents, efficiency of thrickets coastal macrophyte seats has decreased, here and there the vegetation has got island character.

By us it is established, that the muskrat eats roots and runaways of such plants, as a cane (*Scirpus hippolitii*), reed (*Phragmites communis*), few pond weeds (*Potamogeton sp.*), sedges (*Carex* sp.). According to other researchers (Dash, 1993), the fodder diet of the muskrat in Mongolia will consist of 46 various genus of plants. In the beginning of 1970th the muskrat has got in Uvs Lake a hollow after release in a deltoid part river Tes-Khem (Tesiyn-gol) in frontier areas of Republic Tuva (Ochirov, Bashanov, 1975).

Except for that in Mongolia such invasive species as the American mink (*Neovison vison*), the house mouse (*Mus musculus*), brown rat (*Rattus norvegicus*) are widespread. The mink has got from territory of Tuva in Uvs Lake a hollow in the end of 1980th, as well as – on Selenge River (Saveljev, Shurygin, 1997; Dulamtseren et al., 1996), now it is widespread significantly more widely. Till 1990th years foreign mammals got basically on channels of the rivers. But, since 1990th, with fast progress of the international business through frontier the numerous goods, and together with them – and invasive species of insects began to act.

Except for that many residents of the country – fans of animals – bring from trips abroad of different exotic animals (for example, turtles, tortoises), as well as dogs for breeding. We would like to emphasize especially, an importance of studying of influence of invasive species on ecosystem of Mongolia, in fact in some cases they are a vector of propagation of activators of various diseases.

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BIOLOGY OF THE AMUR SLEEPER PERCCOTTUS GLENII, DYBOWSKI, 1877 OF MORDOVINSKAYA FLOODPLAIN OF THE SARATOV RESERVOIR

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According to the data, collected in 2007, 2009–2012 y. in the lakes of Mordovinskaya floodplain, size-age composition, reproduction period, spatial distribution, qualitative and quantitative composition of Amur sleeper food were studied.

For the first time Amur sleeper was registered in the Mordovinskaya floodplain territory in 1998 y. At present it can be found over the entire floodplain. The main problem of our report is an analysis of the size-age characteristics, sexual structure of populations and an investigation of the food composition of the Amur sleeper.

Like all the fishes with the short life cycle, Amur sleeper grows fast during the first and second years of life. In autumn its youngs of the year grow up to 80 mm length and reach the 5.7 g weight. Maximal linear size was noted for the female (at the age of six years) – 240 mm length and 175 g weight.

In the characteristics of the Amur sleeper sexual differences can be traced: males grow faster, but this feature becomes evident since the second year of life, during the sexual maturing. Though the growth rate decreases with each subsequent year, the gap in size between the males and females increases.

Minimal body length of the mature Amur sleeper female in the sample was 80 mm and 85 mm for the male. Usually sexual maturity occurs at the two years age, after reaching 80–85 mm body length and 5–8 g of body weight. Both males and females mature at the age of two years. Sex ratio is close to 1:1. Spawning population consists of six age groups.

Judging from the frequency, Amur sleeper population in the lakes of Mordovinskaya floodplain is large in number. Its average share in the catch during the vegetative period was 50%.

For the most part Amur sleeper becomes active in May, when the temperature of water reaches 10ºC. It forms considerable groups in the higher water plants thickets, at a depth of 0.2 to 1.5 m. Spawning begins as the temperature of water reaches 20ºC, at the first ten-day period of June – the beginning of July. In autumn when the temperature is below 10ºC, Amur sleeper becomes rare in the catches, and disappears just before freezing-over.

Food spectrum of the Amur sleeper consists of the following components: imago and the larval stages of the insects, gastropods, newly-hatched crucian carp, newly-hatched Amur sleeper, zooplankton. Depending on the season, qualitative and quantitative composition of the food changes.

THE PALAEO-INVASIVE UNGULATES IN THE RUSSIAN FAR EAST AND THEIR INFLUENCE ON ENDEMIC SPECIES AND COMMUNITIES

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Commonly, bioinvasion seems to be bad. However, the invaders become of much wider scientific interest than the control of invasions do. If the community structure is a display of the long-term invasions and extinctions, then to define species in an invader-native continuum and to study their distribution are a neccessary way to understand how the communities are structured and what their future is.

The diversity of Far East ungulates is incomparably higher than one in other Russian region: 10 from 19 species of the country besides the cattle. How do their past distribution changes explain their contemporary community structure? What are the species that may be identified as invaders and how can their invasions influence the natives?

The ungulate distribution changes in the Far East may be shown using the Pleistocene and Holocene fossils of the large herbivores in Russia, China, Korea, and Japan. The few initially widely distributed species from the genera *Mammuthus, Coelodonta, Bison,* and *Equus* existed here in the Pleistocene, but become extinct or absent in the Holocene. The same happened to the musk ox *Ovibos moschatus* rewilded recently. Other widely distributed species lost mainly south part of their ranges. Among them, the range of reindeer *Rangifer tarandus* and snow sheep *Ovis nivicola* had the considerable reduction. Its Pleistocene fossils were recorded much further south than now. The range of moose *Alces alces* decreased lesser, and the range reduction of red deer *Cervus elaphus* in the 1900s was least. The whole shift in the range of roe deer *Capreolus pygargus* and wild boar *Sus scrofa* now is insignificant, although their ranges changed formerly. It is difficult to define exactly when the seven appeared in the Far East, but in the Pleistocene-Holocene transition they were widely distributed in Eurasia at least. In the Far East, they are native constituents in the large-herbivore community. It is a rest of the mammoth fauna. The earliest fossils of other three are only in the south Asia. Their ranges expanded later. However the fate of the invaders here was not similar. In the Pleistocene, the low-plastic goral *Nemorhaedus caudatus* and musk deer *Moschus moschiferus* considerably expanded their ranges northwardly. However, their today ranges in the Far East is fragmented nearly without a human impact. The range of the high-plastic sika deer *Cervus nippon* continues to expand in Russia. The specialism of the goral and musk deer will hardly facilitate their considerable influence on natives, which hardly use the same habitats. The sika deer plasticity seems to be main cause of its dominance in the local communities in the south Far East. Thus the plasticity is the essential feature of the successive invader. The presented data show that the invaders enlarge the local and metacommunity diversity rather than disturb them.

COMPARISON NATIVE AND NON-NATIVE BETA-DIVERSITY IN THE SEAS OF EURASIA AND FACTORS, WHICH DETERMINE THEM

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We compare native and non-native biodiversity in the Southern seas of Eurasia on the base of own and published data. Both numbers of native and non-native species decline with salinity decrease in the Seas of Eurasia: from species -rich Mediterranean Sea to lower-species Black Sea and to the species-poor Azov and Caspian seas. High biodiversity in the Mediterranean Sea might be explained diversity of environmental conditions, high salinity and temperature. From the Mediterranean to the Black Sea salinity drops at 21‰, the numbers of native and non-native species decrease both by factor of 3.5.

From the Black Sea to the Sea of Azov salinity drops at 7‰, numbers of native species decreased by factor of 3.4, non-native species – by factor of 3.3. The numbers of native species reduce by factor of 2.5 in the Caspian Sea comparing with the Black Sea ones, numbers of non-native species reduce by factor of 2.6. Thus, numbers of non-native species pro rata the numbers of native species in the Seas of Eurasia and the recognized theory that a rich many-component marine basin less invasible than poor diverse sea with many empty niches does not confirmed in the this case. Our assessment showed that the main factors which limit biodiversity are salinity and low winter temperature.

Thus the very recognized theory that a rich many-component marine basin less invasible than poor diverse water body with many empty niches does not confirmed in the case of the inland Eurasian Seas. To the contrary in these marine basins proportion of non-native species established equal proportion of native species.

INVASIVE TYPES IN PLANT COVER OF SPECIALLY PROTECTED NATURAL TERRITORIES OF KRASNODAR REGION

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Special protected natural territories (SPNT) of Krasnodar region occupy 390.500 ha (5.2% of all area of the region). They protect typical and unique natural landscapes, diversity of fauna and flora, promote the protection of natural and cultural heritage objects, own aesthetic, recreation and health-improving significance. So, in the structure of SPNT floras there are 314 taxons of higher plants having different nature-protecting status (Red book …, 2007). In connection with it, it is very difficult to protect SPNT against anthropogenic transformations, invasions of synanthropic types taking place in the result of different human activity are one of the effects (Gorchakovsky, Kharitonova, 2007).

The study of synanthropic flora fractions of some Krasnodar region SPNT situating on the Black sea coast of Caucasus and in feet of Azov, in foothill, mountain and plain zones of the region (Shvydkaya, 2007, 2012) and the analysis of her own observations and literature data (Kosenko, 1970; Galushko, 1980; Novosad, 1992; Karpun, 1993; Belyuchenko et al., 1999; Solod'ko, 2002; Soltani, 2002; Chukuridi, 2003; Zernov, 2006; Yanenko, 2005 and et.) on flora cities- Black sea health resorts of Krasnodar region having a status of SPNT showed that in its content on precise data there are 411 invasion types of vascular plants from 115 plant families.

The list of plant families in the complex with other floristic characteristics reflects peculiarities of formation and modern condition of studying flora. The most typical diversity is characteristic for families traditionally attracting introducers by their economic means: ***Rosaceae***, ***Asteraceae***, *Poaceae*, (31–41 types), *Brassicaceae*, *Fabaceae*, *Oleaceae* (14–19 types). The movement to the ten of leading families of representatives *Euphorbiaceae*, *Amaranthaceae*, *Cucurbitaceae*, *Chenopodiaceae* (7–13 types) containing in most ruderal types is characterized with the presence of processes of vegetation restoration after different exogenous abnormalities.

Biomorphological spectrum of flora contains information on main plant adaptive mechanisms to the conditions of the given region. It was determined that prevailing biomorph on classification of K.Raunkier are tall aerial plants (186 types) consisting of nearly half of all invasive taxons of SPNT. The most their part (140 types) was fixed by G.A. Soltani (2002) in natural and anthropogenic ecosystems of Black sea coast of Krasnodar region. Surface plants (12 types), hemicryptophytes (20 types) and cryptophytes (33 types) are presented less extensively. There is a significant participation of therophytes (160 types). In some cases there was fixed higher competitiveness of alien therophytes in comparison with local types and active introduction in natural phytocenoses leading to deterioration of their content, structure and phytomeliorative properties.

In most cases invasive types come from countries of Asia (159 types) and regions of Northern, Central and Southern America (128 types) as well. Serious anthropogenic load in the type of illegal cuttings, unorganized tourism, presence of waste product dump, road constructions, communications and etc. intensifies invasive processes on SPNT. The further inventory of invasive flora of SPNT of Krasnodar region is necessary. The deep study of population ecology, consortive connections of types – immigrants will allow to work out the measures on regulation of their numbers.

BAIKAL ENDEMICS IN ZOOBENTHOS OF THE YENISEI RIVER

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In the river Yenisei five Baikal invasive species of the class Malacostraca were found: four amphipods species – ***Eulimnogammarus viridis*** (Dybowsky, 1874), ***Gmelinoides fasciatus*** (Stebbing, 1899), ***Eulimnogammarus cyaneus*** (Dybowsky, 1874), ***Pallasea cancelloides*** (Gerstfeldt, 1858) and one copepods species – ***Harpacticella inopinata*** G.O. Sars, 1909. From the class Oligochaeta ***Nais similis*** Semernoy, 1984, ***Nais tatijanae*** Semernoy, 1984, ***Nais elinguis*** Műller, 1773 were found.

It is known that crustaceans are one of the most active hydrobionts, extended beyond the natural ranges. The invasion of these organisms leads to significant changes in recipient ecosystems. We studied the current state of community of endemic Baikal amphipods in the Yenisei River on the length approximately 780 km down the dam of the Krasnoyarsk hydroelectric station. The most intensive invasion was recorded for ***E. viridis*** and ***G. fasciatus***, which had distributed up from the mouth of the Angara River. Before the Yenisei river was dammed the area of these species stretched down from the mouth of the Angara river, in the Middle Yenisei river, and in the Upper Yenisei river (upstream the mouth of the Angara) only ***E. viridis*** occasionally occurred. The proportion of amphipods in zoobenthos of the Upper Yenisei River was 4.2% of the total biomass in the 1950s, but currently is about 80%. In the Middle Yenisei ***G. fasciatus*** dominates, the abundance of amphipods downstream the mouth of the Angara river (193 ind./m^2) is significantly lower than in the Upper Yenisei River (830 ind./m^2). Ten years of monitoring in the Upper Yenisei river revealed the increase of biomass of amphipods and their expansion into tributaries of the Yenisei river. Amphipods contributed to the displacement of caddis fly and mayfly and reduction of total biodiversity of zoobenthos.

Harpacticoid fauna of the Yenisei River wasn't practically investigated earlier. For the first time for the Yenisei river one harpacticoid species, ***H. inopinata***, was found in three qualitative samples collected by near-bottom trawl in 2011. Obviously abundance of the species at the surveyed stations was high since the number of individuals in the samples was estimated in tens of hundreds. ***H. inopinata*** is known from the Lake Baikal, the Angara River, the Irkutsk, Bratsk and Ust'-Ilimsk reservoirs.

Among Oligochaeta species found in the Yenisei River in 2011, ***N. elinguis*** is cosmopolite, stenotermny psychrophilic and it inhabits the rapid cold streams, pebbly, stony and sandy substrata on shallow zones of water bodies. According literature data the two other species belong to Baikal endemic fauna and they are known from delta of the Selenga River. These species like the above-mentioned ones are appeared to reach the Yenisei through the Angara River.

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SEASONAL DYNAMICS OF POPULATION INDICES OF ALIEN AMPHIPOD (CRUSTACEA: AMPHIPODA) IN LAKE ONEGA

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Since the 2000s, Baikalian amphipod *Gmelinoides fasciatus* Stebbing, 1899 (Gammaridae) have expanded in Lake Onega (Berezina, Panov, 2003; Kukharev et al., 2008). Study the dynamics of population indices of invasive species ***G. fasciatus*** were conducted from late May to early October 2010. Studies carried out at the station Saynavolok. It is a sandy-rocky biotope with ***Phrágmites austrális*** (Cav.) (littoral zone Petrozavodsk bay of Lake Onega). Results of the field surveys indicate that amphipod ***G. fasciatus*** has a one-year life cycle. Seasonal dynamics of population indices has two peak in abundance and three peaks in biomass. The average abundance were 3.44 ± 0.44 thousand ind./m^2. The average biomass up to 7.67 ± 1.31 g/m^2. These indices are within the variation of abundance and biomass of the ***G. fasciatus*** in the littoral zone of Lake Onega (Berezina, Panov, 2003; Kukharev et al, 2008). On the littoral Petrozavodsk bay the maximum indices of abundance and biomass reached 13.500 ind./m^2 and 38.7 g/m^2, respectively. Sexual structure of population ***G. fasciatus*** shows that sex ratio between females and males were not significantly different from 1:1 ($p > 0.05$). However, female ***G. fasciatus*** dominated by up to 93% during the second mass emergence juveniles in August. The fecundity of ***G. fasciatus*** was within a range of 3–27 eggs per female depending on the female length. Seasonal variation in population indices (size-age structure, sexual structure, fecundity) revealed that the alien species ***G. fasciatus*** successfully established in the littoral zone Petrozavodsk bay of Lake Onega.

ALIEN SPECIES OF THE FLORA IN THE MOKSHA RIVER BASIN

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The Moksha River flows in Penza and Ryazan regions and Republic of Mordovia. The upper part of the Moksha river basin is located on the north western spurs of the Volga Upland, middle and lower – on the Oka Don Plain. The river flows into the Oka River in Ryazan region. Its length is 656 km, the area of its basin is 51,000 km^2. The Moksha River basin's vegetation cover rich because it is located in the transition zone between taiga and deciduous forests, forest steppe and steppe. Change in the weather, a variety of types of terrain, soils may expose different floristic complexes.

As part of alien flora the Moksha River basin have been registered 312 species (about 25% of the flora as a whole) of vascular plants from 203 genera and 53 families. Its core is formed ten families of angiosperms: Compositae (46 species), Gramineae (29), Cruciferae and Rosaceae (to 27), Chenopodiaceae and Leguminosae (in 18), Labiatae (13), Polygonaceae and Caryophyllaceae (10), Umbelliferae (9). Dominated by herbaceous plants – 259 species (83%), and more than half of them – annual (52%). This indicates about considerable flora therophytisation. In florogenetic spectrum of alien species the largest group is Asian species (32%), including species from the Iranian Turanian floristic region (16%). The second position is occupied by species of Mediterranean floristic region (25%), the third – American species (22%). By the time drift in the flora there are 57 species of archeophytes and 255 – kenophytes.

The agriophytes and epecophytes is stable component of adventive part of the flora? and whose participation in the study of flora are increased (about 45%). In the Republic of Mordovia flora these groups account for 36% of the Tula region – 35, the Sura River Basin – 32%. Probably this is due to an absence in the studied area cities and railways. Gardening, horticulture, botanical gardens and arboretums introduce into urbanoflora a large number of ephemerophytes and colonophytes. Considerable differences in the nature of naturalization xenophytes on one side and ergasiophytes and xenoergasiophytes on other side was revealed. Among accidentally introduced species increased share of agriophytes and, especially, epecophytes (more than 3.5 times). The group deliberately plants listed on the contrary, almost 3 times more colonophytes and more than 2 times – efemerophytes.

For inclusion in regional Flora Black Book of Mordovia, Penza and Tambov regions was recommended 46 species. Almost half of them (47%) entered the natural communities, others – active are naturalising on disturbed habitats. Half of the species on this list – from North America, growing in our territory under similar climatic conditions. In contrast to the flora of Central Russia in the Moksha river basin in the way of immigration xenophytes predominate (65% vs. 42%). Consequently, biological contamination of flora in the Moksha river basin due more to random drift species. It is also linked to the lack of the basin cities and towns with developed landscaping. The largest number of invasive plants was observed in ruderal communities (62%). Among the natural cenoses greatest transformation undergone meadow (15%), forest meadow and meadow marsh (14%) communities.

EVOLUTION-ECOLOGICAL ASPECTS OF BIOINVASION PROCESS

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The genetic changes observed in populations of species invaders are considered. The special attention is given to those genetic transformations which are capable to provide not only short-term adaptive success, but also to define possible evolutionary trends. On an example of new populations of Clupeonella cultriventris, Proterhinus semilunaris and Neogobius melanostomus are studied variability of the loci coding isoenzymes and haplotypes of mtDNA. As a comparison material, for an estimation of speeds of changes and a role of these transformations in speciation used a material on ancient expansion on example *Ph. lagowskii* and young phylogenetic genera Oreoleuciscus. It is shown, that at invasions, as a rule, levels of genetic variability not only does not decrease, and even increase. It is noticed, that in process of increase in number of new population and achievement of steady level of reproduction the role of new installations loses the importance and are thus formed own original genetic structure. It is established, that in new places of dwelling rare in a parent part of an area allelic variants and haplotypes can reach the status usual or even the dominating. The last is reached with highest probability if there is a positive correlation between sizes of a genetic variety and phenotypic variability. Consequences of existential plurality of invasion are analyzed. Most likely processes of diversification are stimulated more likely with the termination of invasions under a condition of formatting of numerous and extensive populations in new territories.

MOLEKULAR-GENETIC VARIABILITY OF THE ROUND GOBY FROM A NORTH-WEST PART OF BLACK SEA COAST

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Within the limits of research of the genetical causes successful biological invasion it is studied of haplotype diversity on a locus *cyt b* мтДНК of the round goby (*Neogobius melanostomus* (Pallas) in that part of a natural geographic range which is considered as the basic source for invasion – the Northwest part of the Black Sea pool. Populations of the round goby from a considered part of a geographic range are characterised by higher haplotype diversity, than it was marked earlier. It as a whole will be co-ordinated with earlier stated assumption of the greatest genetical diversity of the round goby in the Black Sea part of a geographic range (Brown, Stepien, 2008). At analysis of levels of morphological variability on set of 17 indexes of plastic signs authentic communication with haplotype diversity in different locality has been found. The correlation coefficient between CV, % and haplotype diversity (H) on samples has compounded $r = + 0.94$, at $p < 0.05$. Populations with higher levels of a coefficient of variation were characterised by a considerable quantity of haplotypes. High and differently genetical diversity in initial origin part of areal and its doubtless positive communication with level of morphological variability gives to extraordinary ample opportunities for successful expansions (Weinig et al., 2007), as proves to be true in scales of expansion of the round goby. Moreover, thus depressive consequences of effects of the "founder" and "a bottle neck" are substantially levelled and as it is supposed, recurrence of installations in the presence of a high genetical diversity in donor populations entirely is compensated by negative consequences and provide success of colonisation.

PARASITES OF ALIEN FISH *PERCCOTTUS GLENII*

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The fish rotan, *Perccottus glenii* Dybowski, 1877 (Perciformes, Odontobutidae) is native to the Far East region of Eurasia in Russia, north-eastern China and northern North Korea. More then one hundred years ago (1912) this fish was transported for the first time to the European part of the continent. To date, its non-native range is several times larger than its native one and covers more than 100º West to East and 20º South to North (Reshetnikov, 2010). Non-native populations of rotan have been recorded in Mongolia, Kazakhstan and 14 European countries (Reshetnikov and Ficetola, 2011 with additions). A comprehensive checklist of rotan parasite fauna from territory of its native range was recently done and includes 83 species/taxa (Sokolov, Frolov, 2012; Sokolov, 2013). The first data on parasites of a non-native population of the fish under study were collected by N.G. Shigina and A.A. Shigin in 1968–1970 (Shigina, 1971; Shigin, 1980). Since that time numerous investigations greatly enlarged our knowledge of this topic. Before the beginning of 2013, parasitological data are known for non-native populations of rotan from water bodies of European part of Russia, the Ural, West Siberia, Baikal region as well as of Ukraine, Moldova, Poland, Slovakia, and Serbia. We performed the review of our original and literature parasitological data from non-native populations of this fish species. Altogether more then 110 species/taxa of parasites of various systematic groups (from kinetoplastid flagellates and coccidians to crustaceans and mites) were detected in/on *P. glenii* (Sokolov et al., 2013 with additions). Introduction of this fish into water bodies of Europe and Siberia have diverse parasitological consequences. Some parasites of native fishes use *P. glenii* as a new host in recipient ecosystems (Sokolov et al., 2011). This process has especial significance in ecosystems were rotan became the main food source for native piscivorous animals. Under such conditions rotan can be main vector of transmitting of aboriginal fish parasites to piscivorous animals (Reshetnikov et al., 2013). So, rotan became included in aboriginal parasite systems. Moreover, this fish participates in forming of new parasite systems which were previously unknown for water bodies of the regions under study. Host-specific parasites of rotan were brought to recipient water bodies together with their host. Some of such parasites (e.g., cestode *Nippotaenia mogurndae*) infect native invertebrates (e.g., planctonic copepod crustaceans). Regarding contemporary knowledge about complex life circle of myxozoans, some other parasites of rotan (e.g., myxozoan *Henneguya alexeevi*) may infect aquatic oligochaetas. On the other hand, rotan may be eliminator for parasites because of limited surveillance of some species of parasites in/on this fish species (Sokolov et al., 2012).

HYDRILLA VERTICILLATA (L. FIL.) ROYLE IN THE VOLGOGRAD RESERVOIR

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Vascular water-plants (VWP) is one of the main components of biocenoses of shallow waters of reservoirs of plains. The formation of the hydrophyte water-plants of the Volgograd Reservoir happened in several stages: beginning with almost complete absence of submersed hydrophytes with striking roots in the first years of filling in the Reservoir (1958–1961), intensive development at a depth up to 2 meters and complication of associations by the late 1990s and to spreading out in shallow waters with depth up to 5–6 m at present. «The water nuclear» of flora in the Volgograd Reservoir is compound of more than 60 species VWP, out of which about 30 are hydrophytes (Sedova, 2007).

In July 2010 in the middle zone of the Volgograd Reservoir, downstream Saratov in the open shallow waters of the right bank *Hydrilla verticillata* (L. fil.) Royle (family Hydrocharitaceae) was found. This submersed plant is widely-distributed in reservoirs and water ways of Scandinavia, Ireland, Great Britain, Germany, the Baltic States, Belorussia, Iran, the Himalayas, Japan, China, India, Africa, Australia. In the 1960s *Hydrilla verticillata* was accidentally brought into the USA, where it naturalized quickly and spread widely. In Russia *Hydrilla verticillata* is widely-distributed but scattered – it is pointed out to be found in the south of the West and in the Central Siberia: Omskaya, Tomskaya, Novosibirskaya, Irkutskaya oblasts, Altai and Krasnoyarskiy krai, in the south of continental part of the Far East, in the water basin of Angara. In the Volga basin the species was found in Moscow in the ponds of Moscow Botanical Garden of Academy of Sciencies. This species had not been found before in the water basins and water ways of the upper Volga, as well as in the middle and lower Povolzhye.

In the first year when it was found in the Volgograd Reservoir *Hydrilla verticillata* was seen as individual sprouts in mixed separately placed thickets with *Ceratophyllum demersum* L. and *Potamogeton lucens* L. at a depth up to 1.2–3.5m. In the beginning of the second ten-day period of August florescence of *Hydrilla verticillata* was being noticed, though this phenomenon is supposed to be rather rare, only the female flowers found.

In the shallow waters of the left bank behind islands (downstream town Engels – flood-lands near Anisovka) this water-plant formed monospecies thickets at a depth of 1.5–2 m, it dominated in this zone of submersed water-plants. Earlier these zones used to be occupied by *Elodea canadensis* Michx.

The subsequent observation revealed quick spreading of *Hydrilla verticillata* all over the defined area of water in the Volgograd Reservoir. By 2012 it has been noticed in bulk on flood-lands of Krasniy Yar (upstream town Engels), replacing *Elodea canadensis* in the rooted thickets of hydrophytes, forming both mixed and monospecies thickets. Individual sprouts without striking roots were noticed drifting in the depth of river-flow water.

PROJECT OF THE VORONEZH REGION BLACK LIST

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The inventory of invasive species of plants at regional level belongs one of priorities in invasive biology at the present time. Important point of this work is using the uniform technique for obtaining comparable data. Russian botanists usually analyze the regional "black-lists" with 100 most dangerous alien species, which are invasive in regarded areas (Vinogradova, 2012).

As a result of analysis of species distribution and species behavior in Voronezh province we proposed the preliminary list of invasive plants for this region. There are 4 groups with various invasive status:

STATUS 1. "Transformers" – the species, which are actively invaded natural and semi-natural communities, changing the ecosystems structure, acting as edificators, forming big one-specific thickets, being the competitors with natural species. This group includes 9 species: *Acer negundo, Amelanchier spicata, Bidens frondosa, Echinocystis lobata, Elodea canadensis, Parthenocissus quinquefolia, Phalacroloma annuum, Salix fragilis, Sambucus racemosa*.

STATUS 2. A group of 24 alien species, which are actively spreading and being naturalized in broken semi-natural and natural habitats (*Acorus calamus, Ambrosia artemisiifolia, Aster salignus, Bunias orientalis, Cuscuta campestris, Cyclachaena xanthiifolia, Elaeagnus angustifolia, Elsholtzia ciliata, Epilobium ciliatum, Epilobium pseudorubescens, Fraxinus lanceolata, Fraxinus pennsylvanica, Helianthus tuberosus, Impatiens parviflora, Juncus tenuis, Lemna gibba, Lupinus polyphyllus, Oenothera biennis, Robinia pseudoacacia, Saponaria officinalis, Typha laxmannii, Ulmus pumila, Wolffia arrhiza, Xanthium albinum*).

STATUS 3. The alien species, which are spreading and being naturalized in broken habitats, but apparently, during further naturalization some of them will be able to invading semi-natural and natural communities. 28 species: *Acroptilon repens, Amaranthus albus, Amaranthus blitoides, Amaranthus retroflexus, Ambrosia trifida, Caragana arborescens, Cardaria draba, Chamomilla suaveolens, Cotoneaster lucidus, Corispermum hyssopifolium, Galinsoga parviflora, Hemerocallis fulva, Hordeum jubatum, Impatiens glandulifera, Lactuca tatarica, Lepidium densiflorum, Lonicera tatarica, Onopordum acanthium, Physalis alkekengi, Portulaca oleracea, Sedum reflexum, Sedum spurium, Senecio viscosus, Sisymbrium wolgense, Solidago canadensis, Syringa vulgaris, Tribulus terrestris, Vinca minor.*

STATUS 4. Potentially invasive species, which are capable to a reproduction in infect sites and are invasive in adjacent regions. 31 species: *Abutilon theophrasti, Aegopodium podagraria L. f. variegata, Ajuga reptans, Armoracia rusticana, Arrhenatherum elatius, Atriplex prostrata, Atriplex tatarica, Berberis vulgaris, Bromus japonicus, Bromus squarrosus, Centaurea diffusa, Cynodon dactylon, Datura stramonium, Elymus fibrosus, Eragrostis minor, Eragrostis pilosa, Galega orientalis, Geranium sibiricum, Kochia densiflora, Kochia scoparia, Leymus racemosus subsp. sabulosus, Lolium perenne, Nepeta cataria, Oenothera rubricaulis, Orobanche cumana, Phalaroides arundinacea var. picta, Prunus domestica, Quercus rubra, Sambucus nigra, Senecio vernalis, Zizania latifolia.*

The 12 species are of the intermediate status, 2–3 – *Cerasus vulgaris, Conyza canadensis, Grossularia reclinata, Hippophaё rhamnoides, Lactuca serriola, Mahonia aquifolium, Prunus divaricata, Xanthoxalis stricta*; 3–4 – *Heracleum sosnowskyi, Helianthus subcanescens, Setaria pycnocoma, Sorbaria sorbifolia*.

The “black-list” of Voronezh province differed from those of Middle Russia and Upper-Volga region in species composition: approximately 40% of species are specific invaders in a Chernozem area mainly as a result of environments and anthropogenic transformation of territory.

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THE ANALISYS OF *MNEMIOPSIS LEIDYI* COLONIZER FOOD CHAINS IN THE CASPIAN SEA ECOSYSTEM

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Avalanche development of short-cycle eurybiontic hermaphrodite *Mnemiopsis leidyi* created a danger for existence of the local species of hydrobiont of the Caspian Sea. The leading position of the new colonizer type for the sea ecosystem was reached first of all according to the trophic competition and also at atropous consumption of buoyant eggs and larva of local species, having planktonic development stage.

The results of the food chain research are used in the forecast of the development of the *Mnemiopsis leidyi composite*, and at comparison with special-time and quality-quantitative parameters of the other chains of the food chain (plankton feeder, molluscan shellfish eater) and at evaluation of the development level of the Caspian sea ecosystem in general.

For defining the influence of the *Mnemiopsis leidyi* colonizer on the Caspian Sea ecosystem in general, it is necessary to identify its direct influence on the separate chains in the food chain. Being a zooplankton feeder, *Mnemiopsis leidyi* has its influence first of all on the zooplankton as a whole, and on its separate ecological-taxonomical groups.

Mnemiopsis leidyi nutrition is a dynamic process and it has daily, season, yearly peculiarities of qualitative and quantitative indicators of food bolus, which reflect the influence of main abiotic factors of vertical and horizontal distribution.

Yearly nutrition peculiarities of *Mnemiopsis leidyi* depend on climate and meteorological year peculiarities. For example, anormaly cold and warm winters define the terms of the vegetation period beginning, and the temperature in summer and in autumn defines the intensity of nutrition and the termination period. The season variations in the quantity of zooplankton also reflects the *Mnemiopsis leidyi* nutrition level. In summer period the food links of zooplankton with *Mnemiopsis leidyi* are the defining special-time distribution (vertical and horizontal).

In the Caspian Sea we observe the vertical daily zooplankton migration. Correspondingly according to the time of the day the qualitative and quantitative values of the *Mnemiopsis leidyi nutrition chain*. So, the depth increasing and correspondingly water temperature decreasing, a poikolothermic organism the *Mnemiopsis leidyi* leads to the decreasing of the nutrition intensity. It is important to note, that it is depending on the depth of localization of *Mnemiopsis leidyi* the qualitative indicators of his stomac contence are changed, as it is directly connected with the depth of habitation of the ecological-taxonomic zooplankton types.

The research of peculiarities of the nutrition of *Mnemiopsis leidyi* ctenophoran in the Caspian Sea allows to define more fable chains – the types of zooplankton (especially relict) in the food chain of the pelagian ecosystem, as the Caspian Sea in a whole, and its separate regions. According to this it is necessary to carry out the more detail research of *Mnemiopsis leidyi* ctenophran nutrition peculiarities in every region: taking into consideration the regioning to define the qualitative and quantitative composition of the food chain.

INVASION AND DISTRIBUTION OF *OITHONA BREVICORNIS* GIESBRECHT, 1891 (COPEPODA: CYCLOPOIDA) IN THE SEA OF AZOV

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Acartia tonsa Dana, 1849 (Prusova, 2002) was the only further mesozooplankton copepod species detected in the Sea of Azov over the last decade. In autumn 2010–2012 we first registered the invasion and mass distribution of the new cyclopoid copepod invader known as *Oithona brevicornis* Giesbrecht, 1891, over the entire water area of the Sea of Azov as well as in the western and central parts of the Gulf of Taganrog. The cyclop species identification was performed according to Identification Guide (Shuvalov, 1980; Nishida, 1985).

According to source literature a further species of *O. brevicornis* introduced through ballast water discharge was previously found in the north eastern part of the Black Sea (Zagorodnyaya, 2002; Gubanova, Altuhkov, 2007; Selifonova, 2009; Shiganova et al., 2012). The authors assume that successful development of the O. brevicornis in the Black Sea is connected to the loss of formerly wide spread, ecologically similar and closely related species *Oithona nana* Giesbrecht, 1892, that disappeared from the plankton, as well as to the suppressed Mnemiopsis activity in late autumn. In August 2010 small numbers of *O.brevicornis* (averaging 100 Ind./m^3) (Selifonova, 2011) were found in the southern part of the Sea of Azov, possibly resulting from *O. brevicornis* transfer by wind currents in the Strait of Kerch.

In autumn 2010–2012 the salinity of the Azov Sea fluctuated from 9.0‰ in the western part of the Gulf of Taganrog to 12.9‰ in the southern (Kerch) area. Water temperature varied from 12.6ºC to 20.5ºC. The new invader reached high abundance of 1800–83333 Ind./m^3 and biomass ratio of 5.94–274.999 mg/m^3 then. *O. brevicornis* accounted for 85% of total abundance and 61% of the biomass of the mesozooplankton, and 88% of total abundance and 66% of the biomass of the copepods. In the western and central parts of Taganrog Bay average abundance of this species was 53467 Ind./m^3 with the biomass ratio of 176.44 mg/m^3. The discovery of all developmental stages – mature individuals, all copepoid stages (C I–V) and nauplius stages – was indicative of sufficiently successful development of the invader. Females ranged from 0.53 to 0.59 mm, males – from 0.42 to 0.51 mm in size.

In winter of 2011 and 2012 the disappearance of *O. brevicornis* was established. Low water temperatures cause the death of this invader species allowing for seasonal pattern of its development in the Sea of Azov. The distribution of *O.brevicornis* found in the Black Sea correlated with coastal areas. Considering that the Sea of Azov is a shallow estuarine sea with depths not exceeding 14 m, the development of *O. brevicornis* was observed over its entire water area.

Mass development of this new species caused a change in the zooplankton community copepod species structure of the Sea of Azov in autumn and thus confirmed the expansion of its habitats.

INFLUENCE FISH SPECIES INTRODUCED ON DIVERSITY STRUCTURE OF THE FISH ASSAMBLEGE OF RESERVOIRS OF THE CZECH REPUBLIC

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The species structure of assemblage are hierarchical both in ecological, and in the systematic plan. It is possible to introduce it as bunch of species, each of which consists of several species. Hierarchical structure influences the diversity of assemblage. When new species were introduced into the assemblage, the structure of its diversity was changed. On an example the analysis of angler's catches of the reservoirs of the Czech Republic Lipno, Slapy, Vrané and Hostivar the modification of structure of fish assemblage in connection with growth of abundance of the installed species was studied. Common carp, salmonid and coregonid species, a grass and silver carp were introduced in these water bodies for angling. In the chosen reservoirs the catch of the installed species grew accordingly in a range 1–20, 5–50, 10–95 and 50–390kg/ha. The lobe of Shannon index bound to appearance of installed species compounds to 60% of the total diversity, and the lobe of a diversity of the installed species has increased to 20%. Introduced species gained significant share in catches. Apparently on a dynamic phase portrait at augmentation of a lobe of the installed species the fish assemblage passes in a state with smaller level.

SPECIFIC GROWTH RATE OF THE INVADERS POPULATIONS ON VARIOUS PHASES OF THEIR NATURALIZATION

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Smelt and kilka installed in the Rybinsk reservoir. They compounded more than 50% pelagic fish in different years. Average, maximum and minimum specific growth rate of populations and also a coefficient of variation of the given index are considered on various phases of invaders naturalization in a reservoir. The stable states of invaders populations have been revealed being based on dynamic phase portrait of their catch on gain unit (15 minutes trawl).

VECTORS OF INVASION TO BALKHASH ALAKOL BASIN

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Aboriginal fish fauna of Balkhash Alakol basin is 12 species. Totally, since 1882 45 fish species, including 26 on purport and 19 accidently have been introduced to the basin. Of them, 23 species have adapted.

Main vectors of invasion to the basin are: purposeful introduction, purposeless introduction and trans-border transfer. Purposeful introductions are, on its turn, divided into scientifically based and without scientific base. Scientifically based ones were performed to increase catching fish production of natural basins, development of aquaculture, sport and amateur fishery, and biocontrol (larvafags and herbivorous fish).

Introductions without scientific base were performed before 1920 (sterlet sturgeon, carp and common dace). Amateur fishers and local inhabitants always introduce fish for sport and amateur fishery and out of «purely scientific» interest. After 1991 introduction of stocking material to fish farms, especially small ones, is performed without any scientific base and agreement with authorized bodies.

Unintended introduction is usually connected with the main introduction process and can be explained by: a) low development level of selection and identification technologies used for stocking material in the middle of XXth century; b) escapes of fish farming objects. Another vector of introduction is aquarium husbandry (guppies). Trans-border introduction is limited to two rivers: Emel and Ili. Currently, only two fish species: Chinese false gudgeon and sharpbelly are supposed to migrate to Alakol from China via the Emel river. New for Kazakhstan fish species are found in the Ili River: Blue tilapia, Black Amur bream, Misgurnus mohoity. Considering constancy of the vector we can name it the Ili invasion corridor. Therefore, the main modern vector of invasion to the basin is aquaculture, dominantly, as purposeful introductions without any scientific basis.

As a result of introductions of invasive species in the XXth century fish fauna composition of open water space in lakes of Balkhash, Sasykkol, Koshkarkol and Kapshagai reservoir has been significantly changed. Ichthyocenoses in virtually all water bodies of the basin have been transformed considerably. Area of aboriginal species notably decreased. In the mountain part of the basins of Shelek and Ulken Kokpak rivers, substantially all complex of aboriginal ichthyofauna has been destroyed by introduction of rainbow trout.

During the last 20 years there was no negative impact of new species introduction. However, considering a rise of interest from the business and government side in developing aquaculture, an extension in geography and species composition of introduced fish is expectable. A critical review of acclimatization work results and development of scientific basis and legal norms regulating all stages of acclimatization process is required in order to prevent biological pollution taking into consideration liabilities of Kazakhstan due to the ratified conventions.

MOLECULAR GENETIC CHARACTERISTIC OF RUSSET GROUND SQUIRREL'S POPULATION EMERGED AS A RESULT OF INTRODUCTION IN PENZA REGION

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In 1988 15 males and 15 females of Russet Ground Squirrel (*Spermophilus major* Pall.) were caught in Balakovo district of Saratov Region (steppe slopes of river Mayanga valley) and released near village Mastinovka (Bessonovka district, Penaza Region). The purpose of releasing was an experimental hybridization of Russet and Small (*S. pygmaeus* Pall.) Ground Squirrels. Towards 1990 Small Ground Squirrel almost totally extincted whereas Russet Ground Squirrel was successfully acclimatized and started active dispersing. On the results of 2012 studies Russet Ground Squirrel was dispersed on 8 km towards West, on 20 km towards North-West, on 25 km towards North and on 15 km towards East. As a result on the territory of Penza Region a centre of Russet Ground Squirrel habitat of total area about 600 square kilometers was formed which on 140 km away from the nearest specific wild colonies (Nikolaevka district, Ul'yanovsk Region)

Genetic structure of *S.major* maternal population (n = 10) and 8 populations of intruders (n=28) from Penza Region were studied on 2 mitochondrial DNA markers – control region (C-region) and Cyt B.

Results of mitochondrial DNA (C-region) amplicon's restriction products analysis at individuals from 8 populations of intruders testify to their local monomorphism. Three mitotypes common to Russet Ground Squirrel in Volga Region were revealed – C1, A, B2. First to mitotypes are foreign for *S.major*. If in maternal population mitotypes rate was 1:3:1, then in 5 invasive populations only one mitotype was revealed (one population – only A, four populations – only B2). In other two populations three and two mitotypes (1:3:1 and 1:0:5 respectively) were revealed. Prevalence of one type of maternal population's mitotypes indicates on high rates of colonization by limited number of migrants and also on highly cloned type of new colonies formation. Sequence analysis gave similar results – genetic distances between populations formed as result of dispersion regularly increased with increasing of distance from the point of introduction by simultaneous decreasing of their internal polymorphism rate. Received data let us to reveal a mechanism of formation of Russet Ground Squirrel's new colonies. It characterized by the limited migration of small number of individuals from the maternal colonies and also by the decreasing of genetic variety in new local populations ("bottleneck" effect). At the same time new colonies are viable and with high rates of number increasing that indicates on high rate of adaptive flexibility of Russet Ground Squirrel.

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THE IMPACT OF INVASIVE SPECIES AND ACCLIMATIZED (TERRESTRIAL VERTEBRATES) UPON THE ENDEMIC FAUNA OF KYRGYZSTAN

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The occurrence of absolutely new species within the contemporary period is almost always of anthropogenic nature – it is either importation (intentional or occasional) or activities, connected with transformation of landscapes and changes in life conditions.This process started long ago and at times even many specialists do not suppose that some “common” species appeared in this region relatively not long ago owing to anthropogenic alteration of the landscape. Many “aliens” gradually disappear, whereas other ones, getting into favorable for them conditions, are widely expanding, sometimes forcing out indigenous species.

Intervention of species, alien for the particular region, in the result of systematic acclimatization, occasional importation and introduction of new species is considered in this report, connected with changes in life conditions and their impact on indigenous fauna.

Acclimatization of new species as the state policy of using biological resources affected hydrobionts, especially, fish, for example, almost a half of fish species in the Issyk-Kul Lake are either acclimatized species or introduced species, which led to reduction of the population number and sometimes to almost complete loss of indigenous species.

Fauna of mammals was also actively “enriched” at the expense of target species. Acclimatization affected birds, amphibia and reptiles in the significant less degree.

We give below data on alien types of terrestrial vertebrate species, which could be detected.

Amphibia: Lake frog *(Rana ridibunda)*.

Reptiles: Turkestan gecko *(Tenuidactylus fedtschenkoi)* and Lebetina viper *(Vipera lebetina)*.

Birds: Great tit *(Parus major)* and Myna *(Acridotheres tristis)*.

Mammalse – 20 species, including 14 acclimatized and 6 introduced species: Alpine hare (*Lepus timidus*), Squirrel (*Sciurus vulgaris*), Black rat *(Rattus rattus)*, Norway rat *(Rattus norvegicus)*, Turkestan rat *(Rattus turkestanicus)*, Muskrat *(Ondatra zibetbicus)*, Coypu *(Myocastor coyp)*, Chincilla *(Chinchilla laniger)*, Raccoon dog or Ussurian raccoon dog *(Nyctereutes procyonoides*, Common raccoon or North American raccoon *(Procyon lotor)*, Siberian striped weasel *(Mustela sibirica)*, American mink *(Mustela vison)*, Common marten *(Martes martes)*, Skunk *(Mephitis mephitis)*, Jackal (*Canis aureus*), Bison *(Bison bonasus)*, Japanese deer *(Cervus nippon)*, European red deer, European subspecies *(Cervus elaphus elaphus)*, Fallow deer *(Dama dama)* and Saiga *(Saiga tatarica)*.

The analysis of the targeted acclimatization results shows that huge efforts made and significant financial expenses spent gave a significantly small economic effect – cases of successful introduction of new species are very few. And meanwhile we cannot predict remote consequences of even successful introductions for ecosystems.

And although acclimatization now contradicts the Convention on Biological Diversity, spontaneous importation of new species is going on. This includes new species of fish for commercial and cage culture fishery, amphibia, reptiles and birds, imported by amateurs for maintaining under home conditions. At present there are no structures, normative acts, which could take these processes under control. At previous time and now the quarantine service controlled the invasion of insect-pests, but the effectiveness was not high. Cases of new types introduction in the result of areal expansion and extension do not yield to control, but in such cases at least monitoring of such invasions’ consequences is required. Up to now Kyrgyzstan has no unified state program of introductive works, and there is no any coordination of actions between organizations and persons, which are spontaneously and independently occupied with importation and acclimatization of precious species of living organisms.

THE INVASION OF THE AMERICAN MINK (*NEOVISON VISON*) – THE EXAMPLE OF OVERADAPTATIONS

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The problem of biological invasions of alien species has become one of the most important in the study of ecosystems in the last 50 years. Intentional introduction, accidental transfer, moving animals and plants lead to the serious disturbances in ecosystems and poor performance in the agriculture, forestry and animal-breeding farms, the recreational and sporting appeal of regions and require focusing on solving the problem in the Russia. One of these require attention species is the American mink. Its introduction in the Russia was intentional and unintentional. The American mink resides in the most part of Russian territory and has now been recognized as invasive species (Khlyap et al., 2008). American mink can cause significant damage to muskrats and birds (Geptner et al, 1967; Kolomiytsev, 1985; Poddubnaya, 1995; Chaschuchin, 2009; Kauhala, 1996), compete for food and habitat with mustelids (Kiseleva, 2011; Sidorovich et al. 2007). It is believed that the introduction of American mink has become the main reason of the decline of European mink numbers (Maran, 2007), and today European mink included in the IUCN Red List as a critically endangered species. The current range of European mink includes only a few percent of its historical distribution range. In the 1980s the main Russian population of European mink was in Pskov, Novgorod, Tver, Vologda, Kostroma, Yaroslavl, Kirov, Arkhangelsk, Perm, Komi regions. At the same time, the Vologda region is one of the few areas where the special issues of American mink was never performed, and where the species entered appear only in the early 1980s (Tumanov, 2009). Therefore, one would expect the preservation of its indigenous counterpart in slightly better condition. Our studies conducted in 2004-2012 showed that the American mink inhabits almost all the rivers, lakes and reservoirs (Poddubnaya et al., 2013; Senina et al., 2012). Why American mink is successful in colonizing new ecosystems? It is known that species inherit a huge quantity of structural elements that are formed based on "outdated" information (Kolomiitsev, Poddubnaya, 2010), and among them with high probability may be present and those that are able to improve individual fitness with respect to the new state of the environment and even contain elements of 'overadaptations' or anticipatory adaptation. 'In periods of rapid changes in the environment – that takes place during the invasions also, the rapid expansion of areas and introductions – the importance of such structural features may be comparable with the value of mutations, but unlike the latter, which mostly are lethal, they are the products of the long biological selection and therefore they do not disturb the harmonious epistatic gene interaction (Kolomiytsev, Poddubnaya, 2010, p. 819). The importance of the latter was pointed by Ernst Mayr (1968). The successful acclimatization of American mink in South America and Eurasia is one of the clearest examples of overadaptations species.

ALIEN FISH SPECIES (*CYPRINUS CARPIO HAEMATOPTERUS* TEMMINCK ET SCHLEGEL, 1846) IN THE LENA BASIN

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The Amur carp *Cyprinus carpio haematopterus* Temminck et Schlegel, 1846 was caught on July 20, 2012 near Tyube village, Namsky district in the Middle Lena by Popov I.I. The provided specimen was a female, maturity stage III, aged 8+, body length without C 435 mm, weighing 1490 g. Fulton's and Clark's condition factor of the Amur carp made 2.47 and 2.26%. Gonadosomatic index of the female made 4.92%. The stomach and intestines were somewhat filled with half-digested remains comprising one dipteran and aquatic vegetation. Food bolus weighed 0.15 g. The Amur carp was fished out by a 60 mm stake net.

In 1984 the Amur carp according to the works by A.F. Kirillov, E.V. Ivanov, N.M. Solomonov and et al (2009) was translocated to rear in the fish tanks in the water reservoir-cooler of Neryungri SDPP (GRES). Nearly 2 t of merchantable fish was reared, but in February 1994 fish farming in tanks was abandoned because of unprofitability. Seeding left was released into the reservoir-cooler and carp successfully survived and started breeding. During water releases from the SDPP reservoir in 1997 carps rolled down to the Aldan River. The first 3 carps weighing 3–5 kg were caught in the Middle Aldan in June 1999 approx 1400 km far from the reservoir. In 2000 this species was fished out in the tributaries of the Aldan downstream and in 2001–2005 in the Lena 110 km down and 400 km up the Aldan mouth i.e. over 2000 km from the reservoir. In 2005 2 carps were caught in the downstream of the Vilyui and one – in the Lena down the Vilyui river mouth.

The carps caught in the Lena aged 6+ (2 fishes) had the body length without C 345 mm weighing 550 g; aged 10+ (1 fish) – 570 mm and 4145 g, respectively. In the Amur and Lake Baikal the carp matures at the age of 3+…4+.

Same authors describe in their article that European cisco *Coregonus albula* (Linnaeus, 1758), Arctic cisco *Coregonus autumnalis migratorius* (Georgi, 1775) and grass carp *Ctenopharyngodon idella* (Valenciennes, 1844) were introduced in the Lena basin at different times. Work on acclimatization of the European cisco was conducted from 1954 to 1963 in the system of Eravno-Khargin lakes (Vitim upper reaches, Lena basin). 7 million larval fish was released and it occurred as by-catch in the 70s. The Arctic cisco was translocated in the Vilyui reservoir in 1998 but there was no expected return. 17 grass carps aged 2–5 were released in Bolshoye Eravnoye Lake in 1954, the results of this introduction are unknown.

Recently the invasive data remains unchangeable: the total number of the settled species is only one Amur carp, its share in the community is still negligible. There is no increase in population and it does not affect upon the indigenous populations.

ABOUT FINDS AND DISTRIBUTION OF BRINGING PLANTS IN AQUATIC AND SEMIAQUATIC TCENOSIS KONDO SOSVA ZAURALYE

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Kondo Sosva Zauralye is an extensive region in limits Khanty Mansiysk autonomous okrug – Yugra (KhMAO – Yugra) Tyumen area covering territory between Northern Ural and river Ob – in a direction from west on east, and with headwaters river Konda up to a valley river Northern Sosva – from the south on north. Up to middle of the last century it was rather deaf person, remote and poorly occupied area of northwest of Western Siberia. Now he is one of the most mastered and industrially advanced territories KhMAO – Yugra. In connection with anthropogenous influence there was a penetration and moving of alien plants, development by them various ecotops, including aquatic and semiaquatic habitats. In last 50 years in this territory have appeared and are actively settled *Typha latifolia* L. and *Phragmites australis* (Gav). Trin. ex Steudel. More often these kinds meet on secondary ecotops – about a road downturn, pools, temporary reservoirs. But we mark occurrence *Typha latifolia* far outside the center invasion and introduction in natural phytotcenosis, in particular in territory of reserve "Malaya Sosva", where the kind recently is marked on a coast of one of coastal of lakes. To actively settled on crude wood roads, about a road downturn and pools, crude meadows, edge of bogs, coast of reservoirs concern *Alisma plantago aquatica* L., *Deschampsia cespitosa* (L.). Beauv., *Eleocharis acicularis* (L.). Roem. et Schult., *Eriophorum scheuchzeri* Hoppe, *Juncus alpino articulatus* Chaix, *J. bufonius* L. and *Persicaria lapathifolia* (L.). S.F.Gray. Free from plants damp or crude habitats at roads quite often occupies *Tussilago farfara* L. Some years back are a kind was found out in natural ecotops in territory of reserve on free from plants breakage coast sandy clay coast main rivers – Small Sosva, in two items. Apparently, the drift fruits of plants has taken place by a waterway with headwaters of the river, where the kind has penetrated earlier on motorways. Bringing helophytes we consider the following kinds: *Alisma lanceolatum* With., *Androsace filiformis* Retz., *Bidens radiata* Thuill., *B. tripartita* L., *Carex leporina* L., *Eleocharis austriaca* Hayek, *Epilobium adenocaulon* Hausskn., *Limosella aquatica* L., *Persicaria foliosa* (Lindb. fil.) Kitag., *P. hydropiper* (L). Spach, *P. scabra* (Moench) Mold., *Rumex maritimus* L., *Sparganium glomeratum* (Laest). L. Neum. The listed kinds grow in transformed aquatic habitats, is rare – in natural, located near to the occupied items. The majority of these kinds now are low active, but our supervision testify to their increasing distribution in Kondo Sosva Zauralye. Very seldom on crude roads, about a road downturn or coast of reservoirs on secondary habitats meet *Carex bohemica* Schreb., *Eleocharis mamillata* Lindb. fil., *E. ovata* (Roth) Roem. et Schult., *Juncus conglomeratus* L., *J. effusus* L., *Lycopodiella inundata* (L). Holub. The finds in coastal reservoirs of river basin Small Sosva are interesting *Elatine hydropiper* L. and *E. triandra* Schkuhr. The first kind was met by us in several coastal reservoirs r. Small Sosva, second – only in one lake. In headwaters river Northern Sosva in Turvat lake by us one more water plant – *Elodea canadensis* Michx. was revealed. The populations of these kinds are unstable.

Thus, in flora Kondo Sosva Zauralye we mark 32 kinds bringing water and semiaquatic of vascular plants, the majority from which are senotichesky not active. To number was naturalized in structure hydrophyles of communities it is possible to attribute 10 kinds (31.3%).

INFLUENCE OF ANTHROPOGENIC FACTORS ON *DREISSENA* MOLLUSK DEVELOPMENT IN ZAPOROZHSKOYE (DNEPROVSKOYE) RESERVOIR

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Now the Zaporozhskoye reservoir undergoes the powerful anthropogenous radiochemical press caused by receipt in the reservoir of agro industrial and economic household pollution, man escalated radionuclides from activity of the primary nuclear cycle enterprises and ^{137}Cs and ^{90}Sr artificial Chernobyl radionuclides from the Dnepr River reservoirs located above the cascade. Wherein there is migration of alterogens by the water ecosystem components, their accumulation in bottom deposits and hydrobionts.

Water mollusks actively participate in biogenic migration of elements including metals, radionuclides, etc. within water ecosystems, by means of such biogeochemical blocks: 1) soft tissues; 2) mollusk shells; 3) excrements; 4) pseudo excrements; 5) released mucous substances; 6) dissolved metabolic products released into the water. Due to their filtration activity bivalves differ from other water biota with bigger ability to accumulation of various pollution, they participate in self cleaning processes, improve quality of water and promote compensation of anthropogenous influence. They also are the benthos component dominating by a biomass, the food basis for fishes benthofags, birds.

Wherein zebra mussels (*Dreissena bugensis*, *Dr. polymorpha*) due to their dominant position in the Zaporozhskoye reservoir play the greatest role both in formation of food supply, and in processes of the reservoir self cleaning, first of all from radionuclides. Accordingly to the level of their accumulation by mollusks, it is possible to form up the decreasing row: ***Dreissena*** > ***Viviparidae*** > *Unio*. Levels of specific accumulation of metals by zebra mussels are comparable with ones by other mollusks, only for Sr (chemical analog of Ca) they exceed by several times, due to existence of poorly soluble shells from $CaCO_3$ that promotes ^{90}Sr deposition in bottom deposits; ^{137}Cs deposition is mediated by realization of pellets with their subsequent sedimentation.

The history of zebra mussel mass settling into the Dneprovskoye reservoir began from post war restoration of the Dneproges dam. In 1946 *Dreissena bugensis* was found in quite large number in the lower part of the reservoir where it was brought from the Bugsky estuary by a water transport (Zhuravel, 1965). Now it was settled throughout the water body area, and also in its tributaries: in the upper part of the reservoir zebra mussels play defining role in formation of bottom biocenoses, in the lower part they form powerful fouling of buoys.

Anthropogenous transformation of the waterway, replacement of the rheophilous mode by the firth like one appeared a positive factor for distribution and development of these representatives of the Pontian Caspian complex within the Dneprovskoye reservoir. This is confirmed by the high rate of correlation (r = 0.70) between degree of buoys fouling and the current speed; the coefficient corresponds to the known fact that the current prevents a substrate attachment of zebra mussel larvaes (veligers).

On the other hand, the reservoir pollution has impact on distribution and development of zebra mussels: their indexes were considerably lower in the zone of industrial sewage influence. If zebra mussel biomass on buoys along the river channel was 0.15–3.3 g/sq.dm, opposite to the steel plant and the urban stormwater it was 0. Such negative impact on mollusks is made by surfactants, heavy metals, hydrocarbons of oil and other polluting substances.

Emergence and intensive development of these invasive species caused essential positive changes in the water ecosystem, connected with participation of mussels in processes of self cleaning and formation of the benthic forage base of the reservoir. However it is necessary to fight against the strengthened fouling of ships and hydraulic engineering constructions. An influence of anthropogenic factors on zebra mussels is ambiguous as well.

POSSIBLE WAYS & MEANS OF SETTLEMENT OF GIBEL CARP IN WATERS OF EUROPEAN PART OF USSR

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In the second half of the 19th and the first half of the 20th cc. the gibel carp (abbr. GC) had a mosaic pattern of dispersal in different regions of the European part of Russia. In the majority of known localities their population was low in numbers. This type of distribution can be explained by a comparatively recent appearance of GC in the region. Considering a high environmental flexibility and further onrushing dispersal of GC its pioneer populations date back approximately to the 18 19th cc. Presumably, the earliest populations were coming from both eastern and western directions. The eastern direction was represented by gynogenetic GC tracing origin to the unisexual populations of Western Siberia and Kazakhstan. The western direction was represented by GC with different reproduction types, mainly feral goldfish, less frequently GC brought from Japan and China for marketable fish breeding. Resulting from mixing of GC with different origins and crossing with crucian carp or common carp new breds could originate. The eastern populations were mainly unisexual while the western had different sex ratios. From the end of the 1940s to the end of the 1950s GC was included extensively into the pond fish culture and spread in fish farms. Simultaneously, large scale measures were taken to facilitate the acclimatization of GC. The base stocking material was the Amur GC represented by the Savvinskaya unisexual line and the species brought from the basin of the Amur River. The Savvinskaya line was developed out of a female at VNIIPRH in 1937. The line got spread in the fish farms of Central Russia, the Baltic states, and Belarus. GC was brought to Belarus, the Moscow region and, apparently, some other areas directly from the Amur basin mostly to populate fish farms. The Amur stocking material included gonochoristic specimens. In the Stavropol and Krasnodar territories indigenous gynogenetic stocks were bred. From fish farms GC started to spread into natural water bodies due to different reasons such as purposeful acclimatization, marketable fish breeding, carry over with waste waters. The Savvinskaya line gave birth to unisexual populations, the Amur GC originated from gonochoristic populations. Starting from the second half of the 1960s the situation changed, in many fish farms self replicating gonochoristic stocks were formed proliferating in an uncontrolled manner. In such farms GC became coarse fish. They were regarded as a factor of low production standard and were rarely reflected in farm raised fish reports. GC was no longer grown purposefully in fish farms but it dispersed as an admixture in stock material or came from farming water supply sources when filling the ponds. In this period a major development of fish culture took in lower reaches of the large rivers in the south of the European part of the USSR. Putting fattening ponds into operation outstripped bringing fish nurseries into service; a shortage of stocking material was evident. This shortage was recompensed by fish brought from other regions. The carried stocking material often contained GC. However, in most cases GC was ignored. In the 1960 70s gonochoristic stocks of GC were spread in fish farms of Ukraine, and in the 1970 in the lower reaches of the Volga and the Don. From fish farms into natural water bodies GC got in the same ways as before. The extent of the acclimatization measures decreased. Old and new stocks mixed. Big stocks were formed in large floodplains. From these floodplains the bulk of GC got into rivers and moved along them. In isolated ponds GC was often bred by recreation fishermen. In the European part of the USSR the GC was not considered an alien species; therefore its expansion did not attract much attention.

ALIEN SPECIES *EURYTEMORA VELOX* (LILLJEBORG, 1853) (COPEPODA, CALANOIDA) IN WATER BODIES OF BELARUS

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Eurytemora velox is euryhaline copepod. This species is common for plankton of Northern, Baltic, Caspian, Black and Azov Seas (Brodsky, etc., 1983). The basic native habitats of this species are brackish waters near the river estuaries where it creates large densities and where it is food for carp fishes.

Till 50th years of the last century the species hasn't been registered in water bodies of Belarus. The species not pointed out in publications on a zooplankton (to Lampert, 1900; Рылов, 1915, 1930) for the Belarus territory. For the first time it was found by V.I. Monchenko (1967) in Pripyat River and its tributaries in 1956. Later these finds was proved in floodplain lakes of Pripyat river and in Pina and Skolodinka rivers (Radzimovsky, Polischuk, 1970). New finds of the species were marked also in fresh waters of Europe (Vranovsky, 1994; Samchishina, 2000). It allows to conclude that this species invaded into the water bodies of Belarus recently.

The distribution and abundance of the species on the territory of Belarus in the Dnieper and Western Bug river basin for the periods 1996–1999 and 2007–2012 are studied. The species records in all specified earlier watercourses is confirmed. Moreover, populations of this copepod are widely distributed in Muhavets River and Sozh River and its floodplain lakes. Within central European invasive corridor (Dnieper Western Bug) *E. velox* founded everywhere in the basic riverbed and in additional reservoirs. But this species is not found in upstream of Pripyat River.

The abundance of mature individuals and copepodites are low and varies from 20 to 350 ind./m^3. In water bodies with the slow flow *Eurytemora* populations are characterized by high density from hundreds to several thousands ind./м^3 depending on a biotope. The abundance of nauplii in stagnant reservoir increases to thousands in cubic meter. The maximal development is observed in littoral biotopes in adjoining water bodies of Muhavets, Pina, Sozh rivers and Dnieper Bug canal, the minimum values are observed on riverbed of the Pripyat River. The relative abundance of this species varies from 0.002 to 0.7% in total zooplankton, the average values are 0.14%

The size characteristics of copepodit stages and mature individuals considerably differed for animals from Muhavets River and Sozh River which belong to basins of the different seas (Baltic and Black Sea accordingly). It is known that freshwater copepods have stable size, therefore morphological differences can be result either different origin of these populations or result of influence of different conditions in these basins.

Thus, alien copepod *E. velox* is found only in southern regions of the Republic of Belarus in the Belarusian Polesye rivers belonging to basins of two seas where is founded both in the riverbed and in the floodplain lakes. The average relative density of this alien species is less than 1% from all zooplankton community.

INVASIVE SPECIES OF DREISSENID MUSSELS: THEIR MORPHOLOGICAL VARIABILITY AND GENETIC IDENTIFICATION

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Dreissenids display a high diversity of shell morphology. Taxonomic keys based on shell morphology are not always able to differentiate these species with confidence. In such cases genetic markers are useful in addition to morphological features.

Typical and non typical dreissenid individuals were analyzed in this study. We use restriction fragment length polymorphism (RFLP) and sequence analyses of two mitochondrial DNA fragments encoding 16S rRNA and cytochrome *c* oxidase subunit I (COI) to identify dreissenids (*D. rostriformis, D. bugensis* and *D. polymorpha)*. The obtained data demonstrated that haplotypes of *D. rostriformis* were absent beyond the Caspian Sea. We revealed that morphological feature, namely position of ventro lateral shoulder at the fore part of valve, is a reliable diagnostic feature for *D. polymorpha* and *D. bugensis*.

GENETIC DIVERSITY AND DISTRIBUTION OF *LUPINUS POLYPHYLLUS* IN LITHUANIA

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The landscape of Lithuania rapidly changes under the influence of anthropogenic activity. Spread of alien invasive species disrupts the biological diversity, influences the changes in the ecosystem. Spread of invasive species in Lithuania is also determined by climate change stimulated by global factors: temperature changes and environmental pollution. One of the invasive plant species, altering the species composition of plant communities is a large-leaved lupine (*Lupinus polyphyllus*). In Lithuania this species was for the first time detected in 1931. It is noted that the species aggressively spreads from coniferous forest borders and roadsides into an open, deserted, uncultivated fields. This poses a threat to natural plant communities, biodiversity and landscape. The goal of the research was to study the intraspecific diversity of *L. polyphyllus* populations in forests and abandoned fields. We collected and analyzed individuals from 10 populations of *L. polyphyllus.* Genetic diversity of *L. polyphyllus* populations of forests and fields has been tested using the random amplified polymorphic DNA (RAPD) analyses. Using 6 oligonucleotide primers 200 plants were tested. 135 RAPD reproducible and highly polymorphic loci were established. The UPGMA dendrogram revealed that all plants are genetically different, but individuals of each population group together. AMOVA showed that the genetic diversity among populations was 44%, and among individuals within populations it was higher and amounted to 56%. The presented parameters suggest a supposition that there are no larger genetic differences between forest and field populations of *L. polyphyllus*, or those changes are associated with adaptive loci, which are not always successfully determined using molecular markers. Principal coordinates analysis and UPGMA cluster analysis demonstrated that the majority of the studied populations group regardless of the geographical distances between them. Absence of more distinct genetic differences between forest and abandoned field populations suggests that the spread of this species to new habitats may not be associated with pronounced changes in genetic diversity.

MEASURING AND MANAGING INVASIVE SPECIES THREATS IN HIGH-ARCTIC SVALBARD

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The prevention of biotic invasion is a primary goal of environmental management. In the Arctic there is a need to better characterise present and future marine bioinvasion hazards and risks. We use a vector based assessment to analyse the potential for invasive species to be introduced by the shipping network to Arctic Svalbard under both present and predicted future environmental conditions and shipping activities. The strength of individual vectors was determined by a measure of environmental similarity and connectivity to known potential donor invasive species pools; vector strength was a factor of the potential for a vector to mediate species transfer in ballast water, as biofouling, or both. The Svalbard shipping network connects Svalbard through primary and secondary ports- of-departure to over 200 global ports. Presently, a small fraction of these are environmentally similar to Svalbard, yet this will increase to over 50 ports with estimated sea surface warming. Ships travelling from these ports will connect Svalbard to a pool of over 110 known invasive ballast water and biofouling species. To determine the quantity and composition of organisms currently transported to Svalbard in ballast water we complemented this analysis by sampling the ballast water tanks of bulk carriers arriving in Svalbard. Sample enumeration is ongoing using morphological and DNA barcoding techniques, however preliminary results indicate a number of coastal invasive species are transferred to Svalbard in ballast water in spite of management measures. Together, our data indicate that in the absence of focused preventative management, the risk of species invasion in Svalbard, and the wider Arctic, will become high over coming decades.

BIOACCUMULATION OF HEAVY METALS IN TISSUES OF THE GIBEL CARP *CARASSİUS GİBELİO*: EXAMPLE OF MARMARA LAKE, TURKEY

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In this study, the existence of heavy metals (Al, Cr, Ni, Cu, As, Cd, Hg, Pb) in liver, gill and muscle tissues of gibel carp *Carassius gibelio* and water samples obtained from Marmara Lake was analyzed in seasonal periods. In terms of heavy metals in lake waters, it was determined that there is not any seasonal difference ($p > 0.05$). The mineralization of fish tissues was carried out by microwave wet decomposition. In determining heavy metal concentrations in water and tissue samples, method of inductively coupled plasma – mass spectroscopy (ICP-MS) was used. As a certificated reference matter, TORT 2 lobster hepatopancreas was used in the study. According to obtained results, bioaccumulation rates for gills were found as Cu>Cd>Ni>Pb>Cr>Al>As>Hg, for liver and muscle tissues they were found as Cu>Cd>Ni>Cr>Pb>Al>As>Hg. It was determined that among all the studied tissues, Cu was the most accumulated and Hg was the least accumulated heavy metal.

THE ROLE OF ALIEN SPECIES IN THE FISH COMMUNITIES OF LAKES IN WESTERN SIBERIA

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There have been studied a fish complex in different lakes of Western Siberia within temperate climate zone. The main purpose of the research connects with the construction of predictive models of transformation of fish community in environment fluctuations.

Over the last years the lakes have significantly changing of the geomorphology, hydrology and biocenosis characteristics. In steppe zone 10% of the lakes are drying. Other lakes are in regression and are characterized as shallow with high level of salinity and deficit of dissolved oxygen. Fish richness declined by 50% species in lakes which lose contact with the river system. In isolated deep lakes number of species has decreased about 35% and in the relatively large flowing systems it was decreased before 15%. Fish richness was reduced from four to one species in small shallow lakes after creasing salinity above 2.0 g · sm^{-3} in the summer and 10.0 g · sm^{-3} in the winter. It is known that perch *Perca fluviatilis* and roach *Rutilus rutilus* dominated in most lakes during phase of the transgression. But in recent years the minnow *Phoxinus percnurus* and carp (*Carrassius carassius*, *C. auratus*) prevail everywhere. Consequently the structure of fish communities changed significantly.

The results of a complex survey of lakes systems reflect important role of alien species in the structure of fish communities. Despite the fact that the fisheries management for the introduction of fish was carried during all XX century the positive results was obtained in the begining of the second half of the last century only. Since the 50's years there was naturalized bream *Abramis brama*, pikeperch *Sander lucioperca*, sunbleak *Leucaspius delineatus*, in 80's – the crucian *Carassius auratus* [Chinese carp], carp *Cyprinus carpio*, from the early 90's – the rotan *Perscottus glenii*, since the beginning of 2000's – rudd *Scardinius erythrophalmus* and bleak *Alburnus alburnus* in lowland areas of the study area.

In this regard the relationship between the native fauna and alien species are very relevant. Introduced species constitute the dominant complex of fish in many reservoirs of Ob-Irtysh interfluve. Now it account for 44% of the species richness and the biomass varies between 80–100% in most lakes. In commercial catches dominated Chinese carp *Carrassius auratus* everywhere. Rotan *Perccottus glenii* is being promoted in the shallow lakes and flood waters, and thus poses a threat to native fish reproduction.

There are different mechanisms of distribution of fishes far from their natural areas. It is the accidental introduction as independent resettlement, results of pisciculture management and purposeful checking by fishermen into natural waters. Resettlement of alien species around territory of the Western Siberia interfluve poses a potential risk to the structural elements of biocenosis and biological productivity of lakes. The displacement of the native populations by invasive species causes well-founded fears of biodiversity preservation in the region.

THE NEW SPECIES OF PHYTOPLANKTON OF THE BLACK SEA

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The review of the publications since 1940s and original data since 1998, devoted to a theme of alien species among phytoplankton of the Black Sea are presented. The significant diversity (38-58 species) of old and new exotic species in ecosystem of the Black Sea is noted, among which the majority of species is widespread in a west part of the Sea (especially in Odessa Bay) and Bosphorus region. The tendency of naturalization of new species of phytoplankton in of north-east part of the Black Sea can be traced for the last years.

Latine name / area of the Black Sea

Bacillariophyta:
Biddulphia alternans (Bail.) V.H.[1]
Eucampia cornuta (Cl.) Grun[1]
Rhizosolenia styliformis Brightw. [1]
Thalassiothrix mediterranea Pavill [1,2]
Thalassiothrix frauenfeldii (Grun) Hallegr.[1,3]
Fragillaria striatula Lyngb. [1]
Asterionellopsis glacialis (Castr.) Round. [2,3]
Thalassiosira nordenskioeldii Cleve. [2]
Chaetoceros trondsenii [3]
Chaetoceros divergens var. papilionis Senich[2]
Chaetoceros tortissimus Gran [2,3]
Lioloma pacificum (Cupp) Hasle [2,3]
Pseudonitzschia inflatula Hasle [2]

Dinophyta:
Alexandrium acatenella (Whed. Et Kof.) Balech [2]
A. affine (Inoue et Fukuyo) Balech [2]
A. ostenfeldii (Pauls.) Balech et Tangen. [2,3]
A. tamarense (Lebour) Balech [2,3]
A. minutum Halim [3]
A. monilatum (Howell) Balech [2]
A. pseudogoniaulax (Biecheler) Horiguchi [2]
Achardina sulcata Lohm. [2]
Amphidinium conradi (Conrad.) Schill. [1,2]
A. inflatum Kof. [2]
A. lanceolatum Schrod [2]
A. lacustre Stein [2]
A. larvale Lindem. [2]
A. vigrense Wolosz. [1,2]
A. mannanini Herd. [1]
Ceratium hexacanthum f.contortum (Lemm.) Jorg. [1]
C. massiliense (Gourret) Jorg. [1]
C. furca var. eugrammum (Ehr.) Jorg. [1,2]
C. furca var. seta (Ehr.) Jorg. [1]
C. fusus var. schuttii Lemm. [2]
C. longirostrum Gourr. [2]
C. pulchellum f. dalmaticum (Bohm.) Schill. [2]
C. strictum (Okam. Et Nishik.) Kof. [2]
C. teres Kof. [1]
C. trichoceros (Ehr.) Kof. [1]
C. tripos var. atlanticum Ostf. [1]
C. tripos (O.F. Mull.) *var. tripos* [2]
C. hexacantum f. aestuarium (Schrod) Schill[1]
Cochlodinium citron Kof.et Sw. [1,3]
C. geminatum (Schutt) Schutt [2]
C. helicoides Lebour [2]
C. helix (Pouch.) Lemm. [2]
C. polykrikoides Margelef [2]

Dinophyta:
Diplopsalopsis orbicularis (Paulsen) [2,3]
Dinophysis odiosa (Pavillard) Tai & Scogsberg. [2]
D. schuttii Murr. Et Whitt. [2]
Katodinium rotundatum (Lohm.) Loeblich [2,3]
Goniadoma striatum Mang. [2]
Gymnodinium aeruginosum Stein [2]
G. blax Harris [2,3]
G. heterostriatum Kof. et Sw. [2]
G. lacustre Schill. [2]
G. paradoxum Schill. [1]
G. pygmaeum Lebour [1,2]
G. stellatum Hulburt [2,3]
G. uberrimum (Allman) Kof. et Sw. [2]
Gyrodinium cf. aureolum Hulburt [2]
G. ovum (Schutt) Kof. et Sw. [2]
Oxyphysis oxytoxoides Kof. [2]
Oxytoxum parvum Schill. [1]
O. turbo Kof. [2]
O. variabile Schill. [1,3]
O. viride Schill. [1]
Peridinium aciculiferum Lemm. [2,3]
P. sinaicum Matz [1]
Protoperidinium ponticum Versh. et Morton[3]
Podolampas spinifer Okatumura [2]
Polykrikos kofoidii Chatton [2,3]
Pronoctiluca acuta (Lohm.) Schill. [1]
P. pelagica Fabre-Domer. [1,3]
Pyrocystis hamulus Cl. [1]
P. fusiformis (W. Th.) Mur. [1]
Spatulodinium pseudonoctiluca (Pouchet) Cachon et Cachon [1,2]
Warnowia maculate (Kof. et Sw.) Lind. [2]
W. schuettii (Kof. et Sw.) Schill. [2]

Chrysophyta:
Distephanus speculum var. septenarius Jorg. [2]
D. octonarius var. polyactis (Jorg.) Gleser [2]
Syracosphaera coronata Lochm. [1,3]
S. cornifera Schill. (Helladosphaera) [1]
S. quadricornu (Antthosphaera) Schill. [1]
S. quadricornu (Antthosphaera) Schill. [1]
S. spinosa Lochm. [1]
Calytoptrosphaera incise Schill. [1]
Coccolithus pelagicus (Walich.) Schill. [1]
Rhabdosphaera stylifera Lohm. [1]
Phaeocystis pouchetii (Hariot) Lagerheim [2,3]

Chlorophyta, Prasinophyceae:
Mantoniella squamata (Manton & Parke) Desikach. [2]
Pyramimonas longicauda Van Meel [2]

Note: 1 – Bosphorus area of the Black Sea [Skolka, Bodyanu, 1963; Gergieva, 1993], 2 – Gulf of Odessa, Crimea: Yalta, Sevastopol [Kuzmenko, 1966; Senichkina, 1973, 2001; Senicheva, 2002, Alexandrov, 2001, 2004; Terenko, Terenko, 2000, 2005], 3 – North-eastern part of the Black Sea [Vershinin et al., 2005; Vershinin, Orlova, 2008; Yasakova, 2010; Silkin et al., 2011].

ALLELOPATIC ACTIVITY OF THE INVASIVE WOODY AND SHRUB PLANT SPECIES

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Studies of the mechanisms by which the invasive species influence natural communities are of a great scientific interest as these species are able to successfully compete the native species and invade their communities. This threatens biodiversity and genetic integrity of natural flora and make the environmental problems of the region all the more complicated (Burda, 1991; Ostapko, 2009). There is an increasing evidence of a relationship between a high competitive ability of the woody introducents escaping in the wild and their allelopatic features (Bais, 2003; Csiszar, 2009). Therefore, one of the hypotheses of invasive species success is the 'Novel Weapon' hypothesis, based on allelopatic and other biochemical plant interrelations (Callaway, 2004). Using a generally accepted method of biological assays, originated by A.M. Grodzinsky (1973), we have conducted research on allelopatic features of various concentrations of the leaf fall aqueous extracts of six invasive woody and shrub species from the Southern Eastern Ukraine flora. In all the studied species we have detected the presence of allelopatically active substances, acting predominantly as growth inhibitors. We have grouped *Ailanthus altissima* (Mill.) Swindle and *Acer negundo* L. as allelopatic active plant species (Yeriomenko, 2012) requiring more detailed research. To provide more accurate assessment of the role of invasive species allelopatic features for a phytocenosis, a direct study of these parameters should be held in a phytocenosis itself, being the plant living environment.

We have investigated tree stands of *A. altissima, A. negundo,* characterized by the similar canopy density and represented by specimens aged 40 to 50 years. We have studied the total projection cover and species composition of grass stand within the crown projection of investigated species. To determine their allelopatic features, we used the upper soil assays sampled directly under investigated plants. As control, we used the soil sampled outside the crown projection, i.e. outside the allelopatic field of this plant. Our results show that high concentrations of leaf fall extracts of the studied species significantly inhibit the growth of the test objects. These extracts are characterized by a high value of conditional coumaric units and a high index of allelopatic activity, as compared to control. For example, soil extracts sampled under the crown of *A. altissima* were characterized by the highest inhibitory action and almost completely inhibited development of the test objects. Allelopatic substances of *A. negundo* were characterized by a rather high activity, and inhibited the growth of garden cress by 33.5% and the growth of radish by more than 40%. In the course of investigations of the species composition of grass stand under these trees crown canopy, we have noted an insignificant projection cover (below 20%), as compared to projection cover under the crown projection of other tree species. For example, there were plots where the grass stand was completely absent under the canopy of *A. altissima*. The specific composition of the examined plots was poor and represented by no more than 10 synanthropic species. Hence, the physiologically active substances containing in soil uder the crown canopy of the studied invasive species, act predominantly as growth inhibitors. A number of species, growing under the canopy of *A. altissima* and *A. negundo* is insignificant due not only to the light deficit, but also to their allelopatic activity.

RETROSPECTIVE ANALYSES OF INVASIVE FISH SPECIES INTRODUCTION IN THE ARAL SEA DRAINAGE BASIN ON EXAMPLE OF THE REPUBLIC OF UZBEKISTAN

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The list of fishes of the Republic of Uzbekistan in natural conditions (until 1950 s) according to different estimations included 44–49 species. In the 20th century the ichthyofauna was intensively influenced by various anthropogenic factors: the introduction of invasive species and starting from 1950s transformation of hydrographical and hydrological regimes of aquatic ecosystems caused by the development of irrigation. The introduction of invasive species was commenced with introduction of the mosquito fish in 1920s to control malaria. All fish introductions were aimed for fisheries (except the mosquito fish) and may be grouped into 3 types: a) into the Aral Sea; b) irrigational waterbodies; c) and aquaculture. In general, 47 fish species were introduced, of which 23 were goal oriented and 24 accidental. Donor waterbodies were: the Caspian Sea (8), the Black Sea (1), the Baltic Sea (1), waterbodies of the Caucasus (2), the European part of Russia (8), lakes of Kyrgyzstan (4), fish ponds of Kazakhstan (3) and rivers of the Far East (20). From the European part of Russia 7 species of North American ichthyofauna and 1 Far East specimen were introduced. The mosquito fish was brought from the Caucasus. Three species of Siberian whitefishes (Coregonidae) and the sevan trout which in Lake Issyk Kul has formed a special form – gegarkuni were brought from Kyrgyzstan. Ten species were introduced to the Aral Sea, 4, water reservoirs; 31, to fish ponds. The secondary resettlement was observed for 27 species and 20 species could not resettle within the Aral Sea drainage basin (ASDB). In new natural conditions 31 species could reproduce and 16 species could not. At present 22 introduced species have disappeared, 7 species are rear and 18 species become fully naturalized and even abundant. The commercial structure of introduced species was the following: 6 valuable, 18 commercial and 23 low commercial and trash species.

It is noteworthy that in all cases of naturalization the new species were stocked in artificial waterbodies with unstable local fish fauna, e.g. fish ponds, water reservoirs and lakes of irrigational origin. Numbers of invasive species were naturalized in one waterbody, however, they were not resettled to other ones because of hydrographic or ecologic barriers (e.g. whitefish and trout in Charvak reservoir and spotted stone loach around fish farm “Damachi”). Numbers of species of Chinese complex had advantages in reproduction comparing to local fishes: taking care of offspring, early maturation, portioned spawning, high fecundity (snakehead, three lips, stone morokos, bitterling, amur gobi, sawbelly, ruff (pope). In native habitats these species were exposed stronger predator stress. They won competition with local species such as Zarafshan dace, gudgeon and Tashkent verkhovodka, which disappeared from the mid reach of the Syrdarya River. The range of habitat of other species, such as the Syrdarya dace, the Golden spiny loach, the striped bystryanka and the Kuschakewitch stone loach has significantly dwindled and they remained only in foothill water courses and waterbodies.

AQUATIC INVASIVE SPECIES AND BIOTIC INDICES: A FAKE EVIDENCE OF WATER QUALITY IMPROVEMENT?

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Impacts of anthropogenic pollution on aquatic ecosystems are being addressed in order to protect and restore offshore, coastal, transitional and fresh waters. Many measures to assess and restore degraded water bodies require development of the cost effective monitoring tools and establishment of indices (metrics) that allow to detect human induced changes and classify ecological status. Most indices have been developed for the marine benthic habitats characterised by high biodiversity and therefore of limited use for the low-diversity brackish environment and transitional waters. On the other hand it remains not fully clear, how sensitive these indices might be to external disturbances other than organic pollution.

In this study we consider the empirical evidence how the occurrence of non-indigenous species in macrofaunal assemblages may bias the values of Benthic Quality Index (BQI, Rosenberg et al., 2004) and therefore affect the overall ecological status assessment. This statement is supported by the example of a single invasive species – the zebra mussel ***Dreissena polymorpha*** in the brackish water Curonian Lagoon (SE Baltic Sea). The species is locally dominant in macrofaunal communities and affects the distribution of many other organisms. It forms local “oases” of structural and biological diversity in the benthic environment, consequently complex indexes such as BQI may indicate false environmental quality improvement when used for ecological assessments.

The research leading to these results has received funding from the European Community’s Seventh Framework Programme under Grant Agreement No. 308392 for the project Development of innovative tools for understanding marine biodiversity and assessing good Environmental Status (DEVOTES).

THE INPUT OF ROUND GOBY *NEOGOBIUS MELANOSTOMUS* AND MONKEY GOBY *NEOGOBIUS FLUVIATILIS* IN TROPHIC NETS OF BENTHIC FISHES IN THE DANUBE LAKES

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Round goby *Neogobius melanostomus* (Pallas) and monkey goby *Neogobius fluviatilis* (Pallas) belong to the coastal euryhaline, eurythermal species of fish and are representatives of Pontic relict fauna. In the north-western part of the Black Sea basin their distribution covers the main channels of the Dniester, Dnieper and Danube Rivers. Thus far there was no information about the presence of round goby in the Danube lakes.

A new step in the expansion of the round goby areal in the lakes of the north-western part of the Black Sea was revealed in 2004. It connected with appearance of this species in the Danube lakes: Yalpug and Kugurluy. Changes in physico-chemical parameters in these lakes and the reduction of the number of native benthic species of fish caused intensive and successful settling of round goby in lakes` ecosystems.

Among the various species of fish found in the Danube lakes, we may point at monkey goby, which is not commercial fish in these waters. However, this species is of great importance in the diet of predatory fishes and plays a significant role in their abundance and biomass increase. It can be a food competitor for other benthophage species of fish, primarily for representatives of Cyprinidae.

In this regard, the study of the biological characteristics of goby fishes with a further assessment of their impact on aquatic ecosystems is of great scientific and practical interest. Therefore, the aim of our research was to study nutrition of round goby and monkey goby in the Danube lakes: Yalpug and Kitay.

Collection of samples was carried out in 2011. Fishing gears were drags and fishing rods. To study the feeding 130 food lumps of round goby were analyzed in Yalpug Lake; 220 food lumps of monkey goby in Kitay Lake.

The indices on species and food similarities of individuals of different gender for both species of gobies were no less than 80 and 90 %, respectively. Hence, the qualitative and quantitative composition of the diets of males and females were the significantly similar. Therefore, further investigation of dynamics of gobies` feeding behavior was carried out without subject to fish gender.

The index of relative importance is an integrated indicator of the importance of a separate objects in the diet of fish and includes all quantities of feeding organisms. According to its values in the diet of round goby the most important was *Dreissena polymorpha*, then young fish and Chironomidae. In a feed base of monkey goby, on the contrary, Chironomidae dominated, and then young of gobies, Oligochaeta, as well as *Dreissena polymorpha*.

Having analyzed the feeding of benthophage fishes in these lakes, it was found out that the basic feeding object for *Cyprinus carpio*, *Carassius gibelio*, *Abramis brama* and *Neogobius fluviatilis* is Chironomidae. The round goby preferred *Dreissena polymorpha*. The significance of this shellfish increased in the diet of bream and carp in conditions of reducing of Chironomidae role. Therefore, the round goby and monkey goby can be considered as serious competitors for commercial fish of Cyprinidae.

IMPACTS OF INVASIVE SPECIES ON THE CASPIAN SEA FAUNA IN COASTAL WATERS OF AZERBAIJAN

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The consequence of anthropogenic activity on the pond is the contamination of the last with chemical and biological elements, the results of invasive species, etc., which violates the established liaison of aquatic organisms.

Benthic ecosystem of the Caspian Sea from the time of the expedition O.A. Grimm functioned in a stable regime, its fauna consisted of a stable number of organisms, and the leading species among them were endemic shellfish. The first significant changes in biocenose of bottom of the sea occurred after a natural invasion of the Caspian *Mytilaster lineatus*, which drove out of the biocenosis of zebra mussels having a high feeding value.

The new invaders – barnacles and shellfish crab have found in the 1950s in the benthic biocenosis of the South Caspian. Barnacles widely spread along the bottom, settling on a solid substrate – the sash clams, choked them, making it difficult to filter. Being a predator the crab ate juveniles of benthic invertebrates. Successfully acclimatized in the Caspian Sea clam Abra has achieved great development, and drove out of the bottom biocenosis tserastoderma, valuable benthic fish food organisms.

A new organism of the Azov Black Sea – *Mnemiopsis leydyi* entered at the end of the XX century in the environment of the Caspian Sea, that being a pelagic predator, had an impact on the entire ecosystem of the sea, has caused negative consequences both in the pelagic and benthic ecosystems in fisheries and fishing.

The highest degree of impact of Mnemiopsis on the benthic biota organisms fell on invasive species with pelagic larvae and the most oppressed were abra and crab. Benthic biomass in comparison with the period before the invasion of Mnemiopsis decreased significantly and continues to decline. Judging by the significant fluctuations of abundance and biomass of M.leydyi these signs of stabilization in limit of population growth in the western coastal waters of the South Caspian did not happen.

Discovered in 1981 the plankton copepod Acartia replaced endemic species, has taken a leading position in the total biomass of zooplankton, making in the South Caspian at least 65% of copepods, the result of it was the reduction of biodiversity in zooplankton.

Under the impact of invasive species the changes were made on Caspian Sea ichthyocenosis. In the fish growing economy of Azerbaijan thee carp was introduced along with the planting of carp fish species, then was found in the River Kura, where until the 1980s it was absent. Being sedentary fish, it is within a short span of time mastered the area of the lower reaches of the River Kura and entered the fishery. In 2004 it amounted to 14.7 tons of catches.

Another invader – three spined stickleback was first discovered in Divichi estuary in 1982 (the western coast of the Middle Caspian). In 2006, the three spined stickleback was fished by draggers in the lower reaches of the River Kura. Being a predator, it destroys a large number of juvenile fish species, damaging spawning and rearing farms and affecting the efficiency of river spawning fish.

BIOLOGICAL CONSEQUENCES OF GLOBAL CHANGE

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Global change is now one of the most discussed topics in the world. Indeed, our earth is facing great challenges of global change, such as global warming and human disturbance. Understanding the impact of global change is extremely important for the sustainable development of our society. Unfortunately, the biological consequences of global change have been largely ignored. There is urgent need to strengthen researches on the biological consequences of global change.

It was due to these circumstances that the ISZS initiated an international research program called BCGC in 2008, first supported by the CAS. In 2009, ISZS organized a symposium on BCGC in Beijing and about 130 participants attended the symposium. Also in 2009, BCGC was adopted by IUBS as a new international research program, led by Zhibin Zhang, Yury Yu Dgebuadze and Hari Sharma. In Jun 2010 and Jul 2012, INZ published three special issues on BCGC, edited by Nils Chr. Stenseth and Zhibin Zhang respectively. Currently, there are over 20 scientists from the USA, Australia, Chile, China, France, Germany, India, Israel, Norway and Russia in the program.

The focus of the BCGC program is to organize a diverse group of international experts, with expertise in many scientific disciplines, to develop an understanding of the biological consequences and the mechanisms on biological structures, endangered species and biological disasters under both global climate change and human activities.

BCGC has become a core scientific program of IUBS according to a recent review by IUBS. The program aims to analyze, share and integrate international scientific research and data with the goal of providing a sound scientific basis for addressing the effects that global change is already having or is likely to have on biodiversity, conservation and biological disasters, including biological invasion.

ALIEN PLANT SPECIES IN DRY MEADOW COMMUNITIES OF KARELIA, CENTURY DYNAMICS IN 1900TH

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Dry meadow vegetation occupies less then 1% of Republic of Karelia range. All meadow grasslands in Karelia are of secondary origination therefore their structure is mainly caused by human impact. The process of grassland vegetation can be followed during the latest century when systematized information on grassland flora and vegetation started to collect. The earliest data were collected in 1911–1914 and published by Finnish botanist Kaarlo Linkola (Linkola 1916, 1921). Mid century data were collected by Marianna Ramenskaya in 1948–1954 and published in her monograph called 'Луговая растительность Карелии' (Meadow vegetation of Karelia) (Ramenskaya, 1958). Finally the contemporary data were collected by us in 2001–2012.

Three species lists varying quite strongly, nevertheless most of species 'introduced' during 1900th originate from local flora. The introduction of those species indicates mostly changes in local grasslands ecology rather then species invasion. E.g. eutrophication of grasslands as a result of using fertilizers and air nitrogen pollution caused introduction of nitrophilous weed species on meadows in the second half of century.

True invasive species are presented with ca two dozens of herb and bush species. Mostly they play role of satellite species in the communities or occur there just occasionally. At the same time they can become sub dominants in certain grassland stands (e.g. *Fragaria* x *ananassa* (Weston) Loisel et al. or *Chaerophyllum aromaticum* L.).

Only five species became core or indicator species in meadow communities of Karelia. Four of them (*Melampyrum nemorosum* L., *Potentilla thuringiaca* Bernh. et Link *Silene dioica* (L.) Clairv, *Thlaspi caerulescens* J.Presl et C. Presl) expanded their range without intentional human impact yet human participation in the process of their colonization can not be excluded.

The second half of 1900th is characterized with switching local agriculture from traditional methods to intensive ones. The connectivity of Karelia with neighbouring regions increased as well. As a result seed dispersal increased too. More then ten species of herbaceous plants were sown on the fields or roadsides. However there is just one fescue grass species (*Festuca elatior* L.) that became sub dominant in the stands and serves as an indicator of Magnograminetum association in Karelia Onegensis floristic district. Also one of clover species (*Trifolium hybridum* L.) occurs more or less frequently within the same association stands. All the rest of introduced species were not able on semi natural grasslands and disappeared in few years after ceasing seed income activities.

Not a single species invaded in 1900th has become a dominant in any stand or became core species in any plant associations.

THE FIRST FINDING OF AMUR SLEEPER *PERCCOTTUS GLENII* IN THE MIDDLE YENISEY BASIN

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In 2012 we first found amur sleeper Perccotus glenii in reservoirs of the middle Yenisey basin. During monitoring catching in the system of ponds in the Bugach river (56º04.147’ N, 92º44.163’ E) we collected under yearling and adult specimens of sleeper.

The system of ponds is located in the suburban area of the city of Krasnoyarsk. The distance to the main stream of the Yenisei river is about 10 km. The largest and most well researched pond Bugach is eutrophic reservoir with the area of 0.32 km^2 and an average depth of 2–4 m (Zadorin at al., 2004; Gladyshev at al., 2006). Recent fish fauna of the pond includes two dominant species – silver carp *Carassius gibelio* and sunbleak *Leucaspius delineates*; other species (gudgeon *Gobio gobio*, common perch *Perca fluviatilis*) are characterized by a significantly smaller number (Zadorin at al., , 2004).

From 1998 to 2004, the reservoir was carried out detailed monitoring of fish fauna, 2002–2004 held annual experiments on the introduction of juvenile pike (Zadorin at al., 2004; Gladyshev at al., 2006). During this period, the sleeper in water is not fixed.

Expected time of penetration of sleeper in the pond was the period from 2005 to 2011. Taking into account the in 2012 self reproducing population of the species, you can expect a wide diffusion of sleeper in water bodies near Krasnoyarsk.

GENETIC DIVERSITY AND STRUCTURE OF POPULATIONS OF *ERIGERON ANNUUS* (ASTERACEAE) AN INVASIVE PLANT SPECIES IN LITHUANIA AND NEIGHBOUR COUNTRIES

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During colonization of new areas alien plant species undergo rapid ecological and evolutionary change (Ellstrand, Schierenbeck, 2000). Despite intensive research in which many factors driving plant invasions have been identified, this phenomenon in many cases is still unpredictable (Dietz, Edwards, 2006). It becomes evident that molecular and genetic studies are necessary to reveal intrinsic causes of biological invasions. Here we present investigation of genetic structure of invasive populations of daisy fleabane (*Erigeron annuus* (L.) Pers.). *E. annuus* is an apomictic winter annual plant. Some genotypes of daisy fleabane can reproduce sexually. Starting from 17th century this species spreads in Europe. In Lithuanian expansion of *E. annuus* increased especially at the end of last century and continues in our days. 35 populations of daisy fleabane from Lithuania and Poland were included in this study. We used inter-simple sequence repeat (ISSR) markers to evaluate genetic variability and population structure of *E. annuus.* In Latvia this species is very rare. Daisy fleabane is also occasional in northern part of Lithuania while in central part and especially in southern Lithuania it is very frequent. High genetic differentiation was established among study populations. About half of Lithuanian populations were monomorphic, while all studied populations from Poland were polymorphic. Established populations with low diversity suggest a recent founder effect and obligate asexual reproduction. Founder effect is more expressed in Lithuanian populations that are at the front of the expansion while Poland populations are in the territory which was colonized by *E. annuus* about hundred years earlier. UPGMA cluster analysis also revealed some differences among Lithuanian and Polish populations. These results suggest that at least part of the Lithuanian populations of *E. annuus* come not from neighboring Poland but from other sources, possibly they were introduced as seeds of ornamental plants.

COMPARISON OF LITHUANIAN POPULATIONS OF *IMPATIENS GLANDULIFERA* BASED ON SIMPLE SEQUENCE REPEAT ANALYSES

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Native to Himalayan Mountains *Impatiens glandulifera* as ornamental plant was introduced to Europe in 19^{th} century. Very soon it has become invasive in Southern and Central Europe, presently it spreads intensively in the northern part of the continent. It is an annual plant which invasion is mediated by human. Genetic differentiation of Lithuania populations of *I. glandulifera* was recently analysed by the randomly amplified polymorphic DNA (RAPD; Zybartaite et al., 2011). The objective of present study was further evaluation of molecular diversity of *I. glandulifera* in Lithuania according to Simple Sequence Repeat (SSR) loci. In total, twenty populations from different locations of Lithuania were investigated using six microsatellite loci (IGNSSR101 / EF025990, IGNSSR104 / EF025992, IGNSSR106 / EF025993, IGNSSR203 / EF025994, IGNSSR210 / EF025995, IGNSSR240 / EF025997) created by Provan et al. (2007). Microsatellite PCR conditions were slightly modified, annealing temperature for primers IGNSSR104 / EF025992 and IGNSSR106 / EF025993 were increased from 58ºC to 60ºC degrees to obtain clear scorable products. The fragment size ranged from 101 to 154 bp. The shortest fragments obtained by IGNSSR101 / EF025990 primers and the longest fragments were generated by IGNSSR240 / EF025997 primers. According to the length of these microsatellites loci *I. glandulifera* populations from Lithuania were smaller in few nucleotides compared to those of *I. glandulifera* populations from UK. For Lithuania populations, the number of alleles ranged from 2 to 6, the data obtained was very similar to initial country of *I. glandulifera* residence in Europe. Despite differences in soil, climate and invasion history, also the number of examined population, obtained SSR results show that Lithuanian *I. glandulifera* populations are quite similar to UK ones.

MOLECULAR ANALYSIS OF LITHUANIAN *IMPATIENS PARVIFLORA* BASED ON SIMPLE SEQUENCE REPEAT MARKERS

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Naturally growing in Central Asia, small balsam (*Impatiens parviflora*) is spread in the woods of Central and Northern Europe. *I. parviflora* belongs to the most aggressive invasive species of Lithuania. It is very common species of the city parks and woods also it grows on the borders, roads and paths of the forests. The aim of the research was to investigate genetic variability of populations of *I. parviflora* from different places of Lithuania. Twenty one population was selected from various geographical places of the country (Vilnius-Verkiai, Vilnius-A.Paneriai, Svencionys, Varena-Ziurai, Druskininkai-Ratnycia, Alytus, Kaunas-Vaisvydava, Kaunas-A.Sanciai, Kaunas-Zaliakalnis, Kaunas-Marvele, Juodkrante, Preila, Nida, Karkle, Palanga, Plateliai, Zagare, Panevezys, Anyksciai-Traupis, Jonava-Upninkai, Jonava) in order to cover all the territory. Six microsatellite loci (IGNSSR101 / EF025990, IGNSSR104 / EF025992, IGNSSR106 / EF025993, IGNSSR203 / EF025994, IGNSSR210 / EF025995, IGNSSR240 / EF025997) created for *I. glandulifera* (Provan et al., 2007) were selected for the analysis. The shortest allele was amplified at IGNSSR101 / EF025990 loci (98 bp), while the longest one was generated by IGNSSR203 / EF025994 markers (148 bp). According to the length of some SSR loci (IGNSSR203 / EF025994) *I. parviflora* populations from Lithuania were very similar by size of the fragments of DNA to those of *I. glandulifera* populations in Ireland. The reminder loci were either shorter in several nucleotides (IGNSSR240 / EF025997; IGNSSR101 / EF025990) or longer (IGNSSR240 / EF025997). In terms of the number of alleles, much smaller variability was recorded for *I. parviflora* growing in Lithuania when compared to the microsatellite data of *I. glandulifera* analyzed by the other investigators in United Kingdom. One possible explanation of this observation might be species specific structure of evaluated loci. All examined individuals in Lithuanian populations of *I. parviflora* were heterozygotic at IGNSSR210 / EF025995 loci. It shows that evaluating heterozygosity some SSR markers of *I. glandulifera* might be applied for *I. parviflora* and tested in wider geographical range.