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ANNOTATIONS

ZOOLOGY

Vinogradov Vladislav V., Kelbeshecov Boris K. *Krasnoyarsk state pedagogical university named V.P. Astafieva, Krasnoyarsk, Russia; State nature reserve «Stolby», Krasnoyarsk, Russia.* **STRUCTURAL AND TEMPORAL ORGANIZATION OF THE RODENT COMMUNITY OF THE MIDDLE DARK CONIFEROUS FORESTS OF EASTERN SAYAN (FOR EXAMPLE, RESERVE «STOLBY»).** Analysis of the size and characteristics of community information of small rodents dark coniferous forests Reserve «Stolby» has shown that it is subject to long-term changes and different average degree of stability, as evidenced by the dynamic parameters of diversity and equalization. Phases of the long-term fluctuations of different types of numbers do not match, in connection with which changes the structure of domination annual community. This parameter is formed by sharp fluctuations in the number of dominant species and their rearrangement within the community. Significant influence on the informational characteristics of small rodent community also has a presence or loss of small species. The method of principal component analysis yielded a three-dimensional model of the location of rodents in the hyperspace of the leading environmental factors. In the first place of attachment to the main habitat types in the direction of closed and wet – to the sparse and dry. Secondary factors appear fluctuations in the number and ratio of the character of moisture. Component analysis of the matrix of structural indices showed the lead-dominant species (Cletrionomys rutilus Pall., Cletrionomys rufocanus Pall.) in the structure of domination community for 24 years. Calculation of correlation coefficients between the multi-year performance numbers made it possible: to establish the presence or absence of numerically dependent relationships between species, indirectly assess the degree of overlap of ecological niches, determine the degree of connectedness of community and its overall stability. In general, the analysis allows a high degree of confidence to judge the state as separate populations, and the entire community of small rodents in the territory under consideration and describes him as stable and resistant to the action of factors of different nature.

Key words: small rodents; community; stability; sustainability.

Konusova Olga L., Pogorelov Yuri L., Ostroverkhova Nadezda V., Nechipurenko Anastasia O., Vorotov Aleksandr A., Klimova Elena A., Prokopiev Aleksey S. *The Department of Invertebrate Zoology, Biological Institute of Tomsk State University, Tomsk, Russia; Scientific-Practical Centre «Apis», Tomsk, Russia; [3]Sibirian Botanical Garden of Tomsk State University, Tomsk, Russia.* **HONEY BEE AND BEE-FARMING IN THE TOMSK REGION: PAST, PRESENT AND FUTURE.** Research on honey bees (*Apis mellifera* L.) is an important objective of bee-farming in Russia. Researches are particularly interested in forest dark bees that are resistant to various unfavourable conditions. They live in a number of regions of Russia, including

some apiaries in the Tomsk region. The Tomsk region is abundant in forested areas and other areas with a variety of meliferous plants. Better use of meliferous flora and scientific approach to selection of bee strains best suited to the bee forage and climate of an area can ensure a dramatic rise in honey flow. Thus, the primary goal of honey bee research is assessment of plant resources of a region and analysis of the gene pool of honey bees and means of its preservation. The article discusses the history of bee-farming in Siberia and gives assessment of the current state of bee-farming in the Tomsk region. The latter is characterized by decline of public bee-farming, shift to the private sector and fall in the number of bee colonies. A few regions are taken as examples to demonstrate the productivity of apiaries. Urgent problems of bee-farming are absence of bee breeding farms, bee diseases, lack of qualified farmers. Establishment of the «Apis» research centre within the Department of Invertebrate Zoology at the Institute of Biology of Tomsk State University initiated a research on honey bee biology and bee-farming in the Tomsk region. The centre sets the objective of developing methodological foundation for the revival and intensification of bee-farming in the Tomsk region. Some of upcoming trends are apiary house bee-farming and building farms for breeding forest dark bees as well as other strains of honey bees.

Key words: honey bees (*Apis mellifera* L.); Tomsk region; bee-farming; history and perspectives.

Kuleshov Dmitry A., Romanenko Vladimir N. *Biological Institute of Tomsk State University, Tomsk, Russia.* **LONGICORN BEETLES (COLEOPTERA, CERAMBYCIDAE) OF THE TOMSK REGION.** 96 species of longicorn beetles are registered on the territory of Tomsk oblast, 70 species of them being caught in natural conditions and 13 species found in studied collections (Zoological Museum collections and Invertebrate Zoology department of TSU collections). Despite the fact that the existence of another 13 species of longicorn beetles is only known from literary sources and the fact of finding them is not proved by their presence in studied collections, nevertheless describing the biology of these species enables us to make a conclusion that these species are quite probable to exist on the territory of Tomsk oblast. Nine new species from those caught are proved to exist on the territory of Tomsk oblast. Analyzing the known material from the point of view of common area of distribution of longicorn beetles, one can assume the existence of approximately ten locally distributed and rare species of this family in Tomsk oblast.

Key words: Coleoptera; Cerambycidae; Tomsk region; longicorn beetles.

Romanenko Vladimir N., Cheredova Varvara V. *Biological Institute of Tomsk State University, Tomsk, Russia.* **HUNTING BEHAVIOR OF FREE-LIVING SPIDERS.** The peculiarities of feeding behavior of free-living spiders (Lycosidae, Salticidae, Thomisidae) were studied experimentally. Great differences in hunting behavior of representatives of these families were established, which is connected with different visual abilities and their activity. Jumping-spiders are the most active food consumers of all Siberian spider species of studied families, wolf-spiders and crab-spiders being less voracious. It was found, that spiders Evarcha and Marpisa have good binocular vision and are able to watch their prey at a distance of 8 and 12 cm respectively and jump to catch their prey at a distance of 4 and 8 cm. Wolf-spiders (Lycosidae) do not jump, but accurately determine the place where their prey sits and quickly jump to catch it from the distance of up to 3 cm from any side. Crab-spiders can stalk their prey

but they wait for the prey to touch any of its legs. This being done, crab-spiders make a grab.

Key words: wolf-spiders; jumping-spiders; crab-spiders; feeding behavior; vision; prey model.

Safronov Valery M. *Institute for biological problems of cryolithozone SB RAS, Yakutsk, Sacha Republic, Russia.* **ADAPTIVE FEATURES OF THERMOREGULATION AND MAINTENANCE OF ENERGY BALANCE IN MOUSE-LIKE RODENTS.** Adaptation of small rodents to the contrast temperature conditions is related to the development of chemical thermoregulation and labile morphometric responses. Existing in the narrowed annual range of temperatures they develop adaptations of heat emission regulation and stabilization of metabolism at the low level. Species with a broad area are referred to the first group, while autochtons of the Subarctic to the second group. Stenotopic species take an intermediate place.

Key words: adaptation; thermoregulation; thermoproduction; gas exchange; bioenergetics; metabolism; homeostasis.

SOIL SCIENCE AND FORESTRY

Beh Joseph A., Danchenko Anatoly M. *Institute for Monitoring of Climatic and Ecological Systems SB RAS, Tomsk, Russia; Biological Institute of Tomsk State University, Tomsk, Russia.* **FORESTRY POTENTIAL OF INCREASING PINE FORESTS PRODUCTIVITY IN WESTERN SIBERIA.** The article touches upon the reasons why pine forests in Western Siberia loose their productivity. The main reasons of these losses are: harsh climate, waterlogged territories, poor forest growth conditions, forest fires and failure to comply with rational exploitation methods. Conditionally continuous felling and failure to finish cutting trees result in direct wood loss. Because of these reasons lack of growth exceeds 5 mln m^3 per year. Forestry aims at increasing plantation productivity, retaining and improving increase rate: it is facilitated by sampling dry, dwarfed and defected trees. The attendance being taken in a right way, increase rates of section area and stem wood increase. Analyzing plantation growth according to stem section area in unmixed pine forests, attendance cuttings should start when young trees link their crowns and be carried out after each anthropogenic disturbance and decrease in plantation increase rates. In mixed young growths and mean-aged plantations attendance should be aimed at forming unmixed pine forest stands: first of all trees of other breeds are cut down and only then defected and suppressed specimens of the main breed.

Key words: productivity; increase curve; forestforming process.

Nikolaeva Svetlana A., Savchuk Dmitry A. *Institute for Monitoring of Climatical and Ecological Systems (IMCES SB RAS), Tomsk, Russia.* **PINE TREE AND STAND GROWTH AND DEVELOPMENT IN THE SOUTHERN TOMSK OBLAST.** The growth in pine trees and the development in pine forests are studied in the Tom-Ob divide and right-bank of the Tom river, West Siberia, Russia. The growth stages of even-aged pine generations are identified by change of the basal area increment behaviour and the pine tree ontogenetic stages and pine forest developmental stages are identified by morphological characters. The pine tree ontogeny and pine forest development

are synchronous in the southern Tomsk Oblast. The pine ontogeny are divided into 2 developmental periods and 7 developmental phases, the dynamics of regeneration and aged development of pine forests are divided into 2 developmental periods and 5 developmental phases, and the tree and stand growth dynamics (the basal area increment data) are divided up to 3 growth stages. Some ontogenetic stages in even-aged pine generations coincide with corresponding stages of regeneration and aged development in pine forests. Their time boundaries can be dated by the transition between the tree and stand growth stages except the initial stages when the number of tree rings are a little. If the pine tree and stand development do not delay, the every follow developmental stage become to be longer.

Key words*: Pinus sylvestris*; tree and stand growth stages; tree and stand developmental stages.

AGRICULTURE

Alexeeva Tatiana P., Burmistrova Tatiana I., Naumova Ludmila B., Sysoeva Lydia N., Trunova Nina M. *Siberian Scientific Research Institute of Agriculture and Peat of Russian Academy of Agrarian Sciences, Tomsk, Russia; Department of Chemistry of Tomsk State University, Tomsk, Russia.* **STUDY OF SOME PROPERTIES OF ORGANOMINERAL FERTILIZERS IN THE DEPENDENCE ON THE CONTENT IN THEIR COMPOSITION OF THE ACTIVATED PEAT.** The solution of the ecological and economic problems of agricultural production is possible due to the use OMF, which manifest the biological activity and decrease unproductive expenditures of fertilizers, their entering into the ground water. This is reached because organic matter of fertilizers is represented by lowland type native peat with the inclusion chemically activated peat (hydrolyzate of peat), which is solid waste in production of growth stimulators by peroxide-ammonium hydrolysis method. Properties of nitric-potassic organomineral fertilizers (OMF) and their organic content, depending on activated peat content, and also the form of the utilized nitrogenous fertilizers, were investigated in present study. The subject in our study was lowland type peat of «Dark» layer in Tomsk region (65% humidity) and hydrolyzate of peat (solid residue from the production of the plant growth stimulators). Investigation of agrochemical properties of fertilizers, allow to assume the possibility of fertilizers production with the required ratio of moving elements of nourishment (N: K). After evaluation of moving elements of nourishment, it was shown that the dose of activated peat 10–15% in the composition of fertilizers has a maximum effect on their chemical and agrochemical properties, ensuring them effectiveness of action. Thus, usage of peat hydrolyzate in organomineral fertilizers ensure controlled mineral nourishment into the soil, increasing their economic effectiveness and ecological safety.

Keywords: organic and mineral fertilizers; peat; activated peat; mineral fertilizers; agrochemical properties.

ECOLOGY

Bazanov Vladimir A., Savichev Oleg G., Skugarev Andrey A., Haranzhevskaja Julia A. *Research Institute of Biology and Biophysics of TSU, Tomsk, Russia; Faculties*

of mineralogy and geochemistry of GGF of Tomsk state university, Tomsk, Russia; Society with limited liability «INGEOTEH», Tomsk, Russia; Siberian Scientific Research Institute of Agriculture and Peat of Russian Academy of Agrarian Sciences, Tomsk, Russia. **APPLICATION OF METHOD PHITOINDICATION IN HYDROLOGICAL RESEARCHES OF BOGGY TERRITORIES OF THE WESTERN SIBERIA (BY THE EXAMPLE OF THE SMALL RIVER KLUCH, TOMSK AREA).** The application of the method of phytoindication on the basis of the analysis of space pictures of average resolution for the decision of hydrogeological tasks in the wetlands of the taiga zone of West Siberia is considered. By the example of a little spring «Kluch», typical for the taiga zone, a spatial interdependence between vegetation and hydrogeological conditions in the wetlands is established, which permits to use the method of phytoindication to solve different hydrogeological tasks in hard-to-reach regions of West Siberia. While choosing the phytoindicative indicators, the morphological and ecological characteristics of wetland plants and the character of their association with phytocenoses are taken into account. According to morphological characteristics, a classification of wetland plants of the central part of the taiga zone of West Siberia is developed. For the spring «Kluch» the morphometric characteristics are established with the help of phytoindication. Also it is demonstrated that the catchment basin of this stream is 1,7 times bigger than that stipulated in Rosgidromet materials. As a result, the values of surface run-off of the spring «Kluch» have changed significantly. Besides this, the more correct values for wetland square, including treeless and forest wetland systems, have been obtained. With a glance of the characteristics obtained, an analysis both of water balance structure and temporary alterations of its elements is provided. The analysis discloses the alteration in water regime of the territory under study which is characterized with a certain decrease in the surface run-off in November and December, April–June and increase in August–September. The alteration mentioned above is connected with a statistically significant decrease in general humidification of the catchment area in April, gradual augmentation of evaporation in fall period, growth in duration of transitional fall-winter period and correspondent shortening of moisture supply in snow cover in November–December. In whole, in the nearest- and medium-term prospects, the conditions favorable for the development of wetland-formation processes in the warm period of the year and the improvement of conditions necessary to the existence of vegetation generally exacting to warmth are going to continue which, in a rather severe environment leads to intensification of peat accumulation.

Key words: phytoindication; vegetative community; wetlands; water balance; Western Siberia.

Luschaeva Inna V., Morgalev Yuri N. *Research Institute of Biology and Biophysics of TSU, Tomsk, Russia.* **STUDYING OF THE INFLUENCE OF NANOPARTICLES TIO_2 AND AL_2O_3 ON BACTERIA PSEUDOMONAS FLUORESCENS AND BACILLUS MUCILAGINOSUS.** The using of nanomaterials and nanotechnologies is one of the most perspective directions of the XXI century. Taking into account the fact that nanomaterials will be widely used in different spheres (including medicine) in the future, it is very important to reveal their possible risks already today. Methods of biotesting are ones of the methods of studying the influence of different factors and substances on living organisms. It was studied the influence of nanoparticles TiO_2 (5, 50 and 350 nm) and Al_2O_3 (7, 70 nm and 4 microns) on bacteria *Pseudomonas fluorescens* AP-33 and *Bacillus mucilaginosus* B-1574. The experiments showed that bacterial test cultures are the most sensitive to disperse system of nanopar-

ticles TiO_2 with the size of 5 nm and disperse system of nanoparticles Al_2O_3 with the size of 70 nm and 4 microns.

Key words: nanoparticles; methods of biotesting; test cultures; *Pseudomonas fluorescens*; *Bacillus mucilaginosus*.

Minaeva Oksana M., Akimova Elena E., Minaev Konstantin M., Semyonov Sergei Yu., Pisarchuk Anna D. *Biological Institute of Tomsk State University, Tomsk, Russia; Research Institute of Biology and Biophysics of TSU, Tomsk, Russia; Department of Chemistry of Tomsk State University, Tomsk, Russia.* **UPTAKE OF SOME HEAVY METALS FROM WATER BY WATER HYACINTHS *(EICHHORNIA CRASSIPES* (MART.) SOLMS).** Studies are conducted to determine the uptake of copper, lead, cadmium and zinc ions by water hyacinths from water solution in artificial model conditions. Concentrations of Cu, Pb, Cd and Zn are determined in the leaves of the water hyacinths and solution. The possibility of using water hyacinths plants to purify waters of different purpose from heavy metals is shown. Plants are observed to be exposed to MPC excess of these elements in water, keeping viability and multiplying successfully. During ten days of experiment the concentration of heavy metals decreases more than 5 times for zinc, 6 times for cadmium, 4 times for lead and 8,5 times for copper whereas control shows no changes. Also, it is discovered that the vegetative mass of eichornia (leaves) is not prone to accumulation of these metals. So, the efficiency of the use of plants of the water hyacinth for the purification of waters of different purpose is demonstrated.

Key words: the water hyacinth; MPC (maximum permissible concentration); heavy metals; phytioremediation; aquatic macrophytes.

CONFERENCE

Gureev Aleksey S., Kukharskiy Mikhail S., Novikov Yuri M. *Biological Institute of Tomsk State University, Tomsk, Russia.* **JEAN-BAPTISTE LAMARCK. THE FIRST EVOLUTIONARY THEORY IN LIGHT OF NEW BREAKTHROUGHS IN BIOLOGY.** Two hundred years after the publication of the first evolutionary theory, the attention it had lost has been reclaimed, and it is even gaining new momentum from recent innovations in biology.

Key words: Lamarck; evolution; gradation; advisability.