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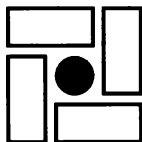
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Scientific and Practical Conference “New Methods of Research on Natural Populations”

The scientific and practical conference “New Methods of Research on Natural Populations” was held in Moscow on October 23–27, 1995, under the aegis of the Center of the Ecological Policy of Russia, the Russian Division of the International Fund “Biotest,” the Russian Representative of the WWF, the Administration of Reserves (Ministry of the Protection of the Environment and Natural Resources of the Russian Federation), and the Kol'tsov Institute of Developmental Biology (Russian Academy of Sciences). The participants of the conference discussed urgent problems of research on natural populations with respect to various approaches of modern populational biology, particularly phenetics, populational genetics, phenogenetics, and ecology. In addition to profound theoretical generalizations, various applied aspects of the analysis of natural populations were discussed. The conference was opened by N.G. Khrushchov, Director of the Institute of Developmental Biology and Corresponding Member of the Russian Academy of Sciences. The plenary session started under the chairmanship of A.V. Yablokov, Corresponding Member of the Russian Academy of Sciences.

Yablokov analyzed the current status of research on populational phenetics and characterized its part in solving different populational problems. The speaker also touched upon many unsolved problems, including the poor development of the theory of features and adequate mathematical methods for analyzing variations in qualitative traits. He also stressed that, thanks to the use of the ontogenetic component through the phenomenon of fluctuating asymmetry in the line of research by V.M. Zakharov, phenetic research achieves a new landmark, enabling us to assess environmental impact on the state of natural systems. The report of **D.A. Krivolutskii** (Moscow State University) concerned survival strategies of animal populations under conditions of radioactive contamination. For ecosystems, the problem of radioactive control is very complicated. It was emphasized that a serious omission on the part of many researchers consists of a lack of data on the absorbed dose. Ignorance of the specific dose often leads to conjectures. Only adequately developed models and standards provide for reliable radioecological control. **L.E. Kaidanov** (St. Petersburg State University) analyzed current views of sources of genetic variation in populations based on research of the genomic instability phenomenon (up to 10% of the genome is capable of translocations). The problem of trends in genetic

variations and their relationship to selection was discussed.

Great interest was evoked by **Zakharov's** report dedicated to developmental homeostasis in natural populations and analysis of possible theoretical and applied aspects of the use of this basic feature, that of developmental homeostasis, for assessing the state of natural populations, from the characteristics of populational structure itself and processes that take place in different ecological groupings up to analysis of intra- and interpopulational differences and microevolution. It was shown that concepts of “health” may be applicable to the assessment of the state of natural systems on the basis of the phenomena of stability and developmental homeostasis. In addition to his profound theoretical statement of the problem, Zakharov's report was thoroughly proven by a variety of specific examples.

The report by **S.O. Sergievskii** (Zoological Institute, Russian Academy of Sciences, St. Petersburg) concerned the elaboration of the methodology and strategy of monitoring populational systems on the basis of the manifestation of polymorphism in mosaic, gradient, monotonous, and stable and unstable environments.

In-depth analysis of the problem of the steady state of chromosome polymorphism as a manifestation of populational and genetic homeostasis was made by **V.N. Stegnii** (Tomsk). **M.V. Mina** (Institute of Developmental Biology, Russian Academy of Sciences, Moscow) and her coauthors (A.N. Miranovskii and Yu.Yu. Dgebuadze, Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow) demonstrated with reference to *Barbus* sp. of Lake Tana in Ethiopia a most intricate pattern of morphological diversification. The research revealed that, under the strictest diagnostics, young of *Barbus* sp. showed significantly fewer species forms than at reproductive and later ontogenetic stages. Multidimensional morphometric analysis demonstrated that, at certain stages of ontogenesis, a unique process of form diversification occurs leading to serious morphogenetic changes, which are treated by zoologists as species changes.

Great attention at this conference has been traditionally paid to phenetic research. The greatest number of reports was submitted to the “Animal Phenetics” section, distributed according to taxonomic principle into three subsections: invertebrates (chaired by Sergievskii); fish, amphibia, reptiles, and birds (chaired by M.M. Pikulik); and mammals (chaired by A.G. Vasil'ev). The effect of natural and anthropogenic environmental

factors on the phenetic structure of populations of the Colorado potato beetle was discussed in the report of **E.P. Klimets** (Brest, Belarus). In-depth phenetic and taxonomic analysis of Palearctic *Lycaena* was made by **E.A. Artem'eva** (Ul'yanovsk). A successful attempt at phenetic monitoring under urban conditions was demonstrated by **A.B. Strel'tsov** (Kaluga). A new landscape approach to the assessment of phenogeographic variation in amphibia and reptiles was suggested by **Pikulik** (Zoological Institute, Belarussian Academy of Sciences). New extensive material on the phenetics of river and lacustrine populations of *Perca fluviatilis* was reported on of **V.N. Zelenetskii** (Darwin Reserve). Generalization of material on the frequencies of phenodeviants of fish led **A.V. Kozhara** (Institute of the Biology of Inland Waters, Russian Academy of Sciences, Borok) to the conclusion that they may be used as an index of the state of aquatic ecosystems. **Vasil'ev** (Institute of Plant and Animal Ecology, Ural Division, Russian Academy of Sciences, Yekaterinburg) discussed general problems in studying phenetic diversity at the populational level from the position of the epigenetic theory of M.A. Shishkin. The communication of **I.A. Vasil'eva** (Institute of Plant and Animal Ecology, Ural Division, Russian Academy of Sciences, Yekaterinburg) was dedicated to the experimental study of the effect of stress factors on the manifestation of skeletal phenes of mice of pure lines. **Yu.K. Galaktionov** (Novosibirsk) reported on leveling of sexual differences in populations of water voles in certain phases of the dynamics of its numbers and the relationship of this phenomenon to reproduction. Particular interest and discussion were evoked by the report of **S.B. Kuznetsov** (Institute of Cytology and Genetics, Siberian Division, Russian Academy of Sciences, Novosibirsk) on populational and genetic research in the lesser snow goose on Wrangel Island. **N.N. Khromov-Borisov** (St. Petersburg State University) demonstrated pathways for correct statistical analysis of qualitative traits.

Considerably fewer reports were presented in the "Plant Phenetics" section, which included three subsections: general items (chaired by N.V. Glotov and N.S. Rostova); the phenetics of particular species (chaired by Yu.N. Isakov); and plant populational ecology (chaired by L.A. Zhukova). However, unlike the conceptual uniformity of the plenary meeting and zoology sections, the botanical section showed a considerable diversity of reports and communications. The report of **Glotov and Khromov-Borisov** (St. Petersburg State University) concerned methodical aspects of work with a variety of qualitative traits and the necessity of matching the statistical methods used to the specificity of the initial data. The authors pointed out, for instance, that it is more appropriate to use loglinear models based on the *G*-test instead of the widely used chi-square test; the possibility of "curtailing" (concentrating) information present in $R \times C$ contingency tables is also of interest. **V.V. Korona** (Ural State University, Yekaterinburg) analyzed form (with reference to leaf

shape) from the point of view of the process of the realization of its program of steady structural complication. Different leaves on the shoot (and on various shoots) reflect the degree of the realization of this program. **Rostova** (St. Petersburg University) considered the evolutionary significance of the plasticity of the system of inner relations. Unlike eurybiontic forms with wide ranges, more specialized forms with limited ranges (as well as cultural forms derived as a result of strict selection), as a rule, lose the ability to transform the correlation system of intrapopulational variation. Correspondingly, their ability to adapt to deterioration of the environment is limited by the intensification of the strength of relations (without changes in their structure).

Specific features of variability in populations of woody plants were considered in detail in reports by **L.I. Milyutin** (Institute of Forestry, Siberian Division, Russian Academy of Sciences, Krasnoyarsk) and by **Yu.N. Isakov** and **A.I. Iroshnikov** (Voronezh). The report by **A.I. Vidyakin** (Vyatka) dealing with detailed analysis of specific features of seeds of Scotch pine may also be referred to this group of research. The author, in addition to distinguishing individual structurally separated components responsible for particular coloration, also attributed (according to survey data from the Vyatskaya oblast) different frequencies of phenes to particular landscape plots. The reports by **I.T. Paponova** (Perm) and **O.I. Evstigneev** (Bryanskii Forest Reserve) were somewhat similar: they concerned problems in demographic research on plant populations. A detailed report by **Zhukova** and the adjoining report by **S.V. Balakhonov et al.** (Mari State University) clearly demonstrated the necessity of recording the ontogenetic states of plants of different biomorphs during population monitoring.

A particular place was occupied by reports of the section "Intravital Methods for Research on Natural Populations" (chaired by N.A. Formozov), which were dedicated to urgent methods for humane and merciful studies of animals in nature that often make it possible to obtain more precise conclusions concerning the structure and mechanisms of population functioning than with conventional methods, as was shown in the report by **K. Edlstrom** (Natural History Museum, Stockholm, Sweden).

The conference participants were deeply impressed by a series of reports in the framework of the V International Symposium "Biotest: Assessment of the State of Natural Populations by Developmental Homeostasis" (plenary meetings and sections were chaired by Zakharov, V.Ya. Brodskii, V.A. Veselovskii, Dgebuadze, and A.S. Baranov). The reports with reference to model objects from different taxa, including fish (A.A. Zyuzin, Baranov, V.I. Borisov, and A.V. Valetskii), amphibia and reptiles (A.T. Chubinishvili and Baranov), birds (P.D. Vengerov), mammals (Baranov, Borisov, and Valetskii), and plants (E.K. Chistyakova and N.G. Kryazheva), demonstrated the reliability of conclusions derived by biotest methods with respect to

the "health" of particular populations and ecosystems obtained on the basis of morphological analysis of fluctuating asymmetry—the index of developmental stability after Zakharov. In the framework of the new BIOTEST technology suggested for biomonitoring, several approaches were discussed, including genetic (S.G. Dmitriev, Institute of Developmental Biology, Russian Academy of Sciences), physiological (A.I. Zotin, G.A. Klevezal', S.Yu. Kleimenov, Mina, and A.V. Peskin, Institute of Developmental Biology, Russian Academy of Sciences, Moscow), and immunological (A.V. Pronin, Institute of Experimental Medicine, Russian Academy of Medical Sciences, Moscow). Fluctuating asymmetry and the stability of development were treated in reports by **J. Graham** (Biology

Department, Rome, Georgia, USA), **D.L. Laius** (Zoological Institute, Russian Academy of Sciences, St. Petersburg), **A.M. Marvin** (Ural State University, Yekaterinburg), **A.V. Kozhara** (Institute of the Biology of Inland Waters, Russian Academy of Sciences, Borok), etc. The conference proved that phenetic methods based on the use of the phenomenon of the fluctuating asymmetry of bilateral structures are becoming the most effective methods for population research and biomonitoring.

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