



## Editorial

### Stanislav N. Sannikov – 90<sup>th</sup> birthday

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Prof. Stanislav N. Sannikov, Dr. Sci., one of the leading Russian experts in forestry and forest population biology and Leading Research Scientist at the Botanical Garden, Ural Branch RAN, Yekaterinburg, turned 90 on October 22, 2019.

Sannikov was born in Sverdlovsk (now Yekaterinburg), into the family of a construction engineer. From early age, he enjoyed making excursions and observations in the woods and reading about natural history. Upon graduation from school in 1947 with a gold medal, he could have been admitted to any university, yet he chose to study forestry at the Ural Forestry Engineering Institute (later named as a University). There, under the guidance of prominent teaching scientists, such as Pavel L. Gorchakovsky, Nil A. Konovalov, Leonid I. Vigorov, he mastered the basics of Forest Science and, most importantly, acquired a view on the forest as a harmonic ecosystem determined by the evolutionary process. After graduating from the Faculty of Forest Management in 1952, he worked as a forest engineer in Kurgan Region.

In 1954 Sannikov started his PhD research at the Institute of Biology, Ural Branch, USSR Acad. Sci., dedicating it to the problem of forest regeneration, which became his lifelong passion and the centerpiece of his studies. Sannikov's scientific views were formed under the influence of Stanislav S. Schwartz and Nikolay V. Timofeev-Resovsky, the leading researchers at the Ural Branch. Interested in detailed, in-depth study, Sannikov ran long-term observations at forest research stations. He analyzed in every detail ecological factors determining the quantitative dynamics of Scots pine, *Pinus sylvestris* L., regeneration in various micro-habitats under the forest canopy and defended his PhD thesis on this topic.

His work over many years, both at research stations and on expeditions, has been invariably characterized by an approach from the population biology standpoint. He has obtained and theoretically interpreted a number of critical results in forest ecology, genetics, and geography. One of his major achievements was providing a complex morphological and eco-physiological justification for his own segregation of stages during Scots pine development (ontogenesis), which has proved to be crucial for understanding the population dynamics.

Sannikov's experiments under the forest canopy, within clearings, and in burnt areas have demonstrated the critical role that drastic differences in habitat conditions and types of surface substrate play in the growth and quantitative dynamics of saplings. He identified optimal conditions and maximal regeneration values for the mineral substrate formed after fires in all studied forest types, in a number of regions.

Forest fires and their ecological and evolutionary role in seedling recruitment and development of lighted coniferous forests have presented a lifelong interest for Sannikov. As a result of his generalizations, he has been able to describe and explain the petro-psammophytic nature of Scots pine and propose a general hypothesis of "pulsed micro-evolution in populations."

While studying the unique chain of pine forests, represented by zone-specific forest types and stretching 1,500 km from north to south across West Siberia and the Turgai Plateau in Kazakhstan, Sannikov has developed an ordination system for these forests and an entirely new research direction, which he called "coeno-ecogeography of populations." In his Doctor of Science thesis defended in 1987, Sannikov described gradients of climate and soil as well as Scots pine stand structure and regeneration from the northern to southern limit of the species.

As a result of his studies of divergent and convergent secondary/age successions of pine forests, Sannikov developed a concept of "eco-dynamic series describing regeneration and development of biogeocoenoses" within the framework of a single climax forest type. Later, he further developed this concept into an innovative ecological-genetic classification of forest types. Differently from the "linear" genetic typology proposed by Ivashkevich and Kolesnikov, in Sannikov's system each forest type includes a cluster of serial plant communities developing after catastrophic events, such as fires, hurricanes, or forest clearances.

His own "micro-ecosystemic" approach to the analysis of structural and functional relationships in the forest has allowed Sannikov and his colleagues to demonstrate the crucial role of the tree-edificator stand in the formation of all other ecosystem components, particularly

via root competition, and thus justify his original definition of the forest as “a dendro-coenoecosystem characterized by underground continuous interconnections.”

Sannikov successfully implemented V.N. Sukaczev’s idea of starting a biogeocoenological research forest station: he organized such an institution in Talitsa, southern West Siberia, within the dry Scots pine forest area stretching along the Pyshma River. Foresters and ecologists from many institutions have been using the station for a wide array of projects staged at shared objects of study within forest, herbaceous upland communities (meadows), and wetland ecosystems. As a result of the 30-year investigations, Sannikov proposed and justified organization of the *Pyshma Pine Forests (Pripyshmyskiye Bory)* National Park as a conservation area. Having a total area of 49,500 hectares, the National Park was founded in 1993.

More recently, Sannikov with colleagues has been studying genetic differentiation in pine populations, as it determines the phenotypic adaptive expression. Some 290 Scots pine populations within the entire geographic area of the pine, from Scotland to the Sea of Okhotsk, have been studied as regards their allozyme structure and genotype gradients. The study included gaps and transitional zones between populations within uplands, wetlands, mountain ridges, and watersheds. Emphasis was laid on reproductive isolation factors, species expansion through hydrochory, as well as possible Pleistocene refugia. A spatial outline of the genetic structure of the species has been proposed. A similar genetic-geographic study for common heather within its geographic range has also been brought close to its conclusive stage. Directions of research undertaken under Sannikov’s leadership are summarized in the 2012 book *Ocherki po teorii lesnoy populyatsionnoy biologii (Essays on the theory of forest population biology)*.

Today Sannikov with his staff continues elaborating on a number of problems in the ecology and genetics of conifers, working on the creation of reservations for the preservation of species’ genetic pools, on the zoning of forest seed pools, and also on the protection of forests from destructive crown fires.

Sannikov has authored more than 250 scientific publications, including seven monographs, and registered two inventions. His scientific achievements are well known across Russia and abroad. He has been a representative of the International Union of Forest Research Organizations, an expert judging the *Ural* Regional Competition held by the Russian Foundation for Fundamental Research, a member of the Ural State Forestry University Council, a reviewer for a number of scientific journals. He has curated one Doctorate and 14 Candidate (PhD) dissertations. Sannikov’s scientific achievements have been honoured with the gold medal of the

All-Russia Exhibition of Economic Achievements, the N.V. Timofeev-Resovsky Award, the S.S. Schwartz Award of the Ural Branch, RAN, and the title of *Honoured Ecologist of the Russian Federation*.

Dear Stanislav Nikolayevich, we, your colleagues – foresters and ecologists, are celebrating your birthday and wishing you good health and new scientific achievements for the benefit of the Russian forest!

Botanical Garden, Ural Branch RAS, Yekaterinburg  
Institute of Plant and Animal Ecology, Ural Branch RAS, Yekaterinburg  
Ural State Forestry Engineering University, Yekaterinburg  
Institute of Biology, Komi Science Center, Ural Branch RAS, Syktyvkar  
Center for Ecology and Forest Productivity, RAS, Moscow  
V.N.Sukaczhev Forest Institute, Siberian Branch RAS, Krasnoyarsk  
All-Russian Research Institute of Forestry and Forestry Mechanization, Pushkino, Moscow Region  
St. Petersburg Research Institute of Forestry, St. Petersburg  
Institute of Biological Problems of Cryolithozone, Siberian Branch RAS, Yakutsk  
Far Eastern Research Institute of Forestry, Khabarovsk  
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Contribution edited by Irina Kadis.