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ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ УЧРЕЖДЕНИЕ НАУКИ
ИНСТИТУТ ЭКОЛОГИИ РАСТЕНИЙ И ЖИВОТНЫХ УРАЛЬСКОГО ОТДЕЛЕНИЯ
РОССИЙСКОЙ АКАДЕМИИ НАУК

ЭКОЛОГИЯ И ЭВОЛЮЦИЯ: НОВЫЕ ГОРИЗОНТЫ

МАТЕРИАЛЫ МЕЖДУНАРОДНОГО СИМПОЗИУМА, ПОСВЯЩЕННОГО 100-ЛЕТИЮ АКАДЕМИКА С. С. ШВАРЦА ЕКАТЕРИНБУРГ, 1–5 АПРЕЛЯ 2019 г.

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Экология и эволюция: новые горизонты: материалы Международного симпозиума, посвященного 100-летию академика С. С. Шварца (1–5 апреля, 2019, г. Екатеринбург). — Екатеринбург: Гуманитарный университет, 2019. — 698 с.

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Обсуждаются актуальные проблемы фундаментальной экологии в связи с быстрыми антропогенными и климатическими изменениями биоты, происходящими в мире. Рассмотрены современное состояние и перспективы решения проблем теоретической экологии, популяционной и эволюционной экологии, экологической морфологии и экофизиологии, экологической генетики и филогеографии, исторической экологии и палеоэкологии, радиационной экологии и экотоксикологии, а также экологии сообществ и филоценогенетики. Предложены новые теоретические представления в области эволюционной и популяционной синэкологии; обсуждаются новые подходы на стыке молекулярной генетики, филогенетики и экологии. Особое внимание уделено современным представлениям об эволюции: изучению биологического разнообразия на разных уровнях организации; методам экологического прогнозирования, моделирования и технологиям рационального природопользования.

В сборнике представлены материалы докладов участников из России, Азербайджана, Армении, Белоруссии, Германии, Израиля, Казахстана, Монголии, Нидерландов, Норвегии, Польши, Словении, Узбекистана, Украины, Финляндии, Чехии, и других стран.

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ECOLOGY AND EVOLUTION: NEW CHALLENGES

PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM DEDICATED TO THE 100TH ANNIVERSARY OF THE RUSSIAN ACADEMICIAN S. S. SHWARTZ
RUSSIA, EKATERINBURG, APRIL 1–5, 2019

Ekaterinburg
2019

Ecology and Evolution: New Challenges: Proceedings of the International Symposium dedicated to the celebration of 100th anniversary of RAS Academician S. S. Shwartz (**April 1–5, 2019**, Ekaterinburg, Russia). — Ekaterinburg: Liberal Arts University — University for Humanities, 2019. — 698 p.

The International Symposium ***'Ecology and evolution: New challenges'*** was dedicated to the celebration of S. S. Shwartz' 100th anniversary. RAS Academician S. S. Shwartz (1919–1976) was a prominent Russian ecologist whose contribution to the field of population and evolution ecology is hard to overestimate. He is deservedly regarded as the father of the Ural ecological scientific school. He was also the founder and editor-in-chief of the Russian Journal of Ecology. S. S. Shwartz was awarded a number of state civilian decorations and awards, including A. N. Severtsov' Award.

The Symposium was aimed at facilitating discussions among its participants around pressing issues of fundamental ecology associated with global anthropogenic and climatic changes in biota. The discussions focused on the current state and prospects of solving urgent ecological problems arising in the fields of theoretical ecology, population and evolutionary ecology, ecological morphology, ecophysiology, ecological genetics, phylogeography, historical ecology, paleoecology, radiation ecology, ecotoxicology as well as the ecology of communities and phylocoenogenetics. New theoretical concepts in the fields of evolutionary and population synecology were presented, along with most recent advancements at the interface between molecular genetics, phylogenetics and ecology. The historical aspects of the development of modern ecology were discussed. A particular attention was paid to contemporary views on evolution, novel approaches to investigating the biological diversity of various groups of organisms, the methods of ecological forecasting and modelling, as well as to the technologies of rational environmental management, facilitating the application of scientific achievements in practice.

This book of Proceedings presents Symposium papers delivered by participants from Russia, Azerbaijan, Armenia, Belarus, Germany, Israel, Kazakhstan, Mongolia, the Netherlands, Norway, Poland, Slovenia, Uzbekistan, Ukraine, Finland, Czech Republic, and others.

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РЕЗУЛЬТАТЫ ЭКСПЕРИМЕНТА С *FRAGARIA VESCA* L. (ROSACEAE) В КОНЦЕПЦИИ «ПОЛИЦЕНТРИЧЕСКАЯ МОДЕЛЬ РАСТЕНИЯ»

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The field diary, made on the basis of a qualitatively staged experiment with a live plant in the natural environment, has no statute of limitations. The methodological apparatus of the researcher is being improved. In this regard, at different stages of the study, it is possible to discover unknown facts from the life of the plant and the laws of the development of the plant's population system. Field experience with the plant is almost impossible to repeat because of differences in climatic factors. Each field experiment is unique and the scientific result from it is also unique.

Let us turn to the data of the experiment with *Fragaria vesca* L. (Rosaceae), which were collected in 1996 at the Biological Station of Kazan University (65°50‘ N 48°48‘ E). The results of the experiment were presented in a series of publications (Fedorova, 2002, 2007, 2008). The experimental data will be revised in the new concept of «Polycentric Plant Model» in order to determine the feasibility of using this concept to conduct research in the field of plant population ecology using the example of *F. vesca*. Tasks: 1.Demonstrate a change in the statistical parameters of indicators characterizing the growth and development of a plant in plantings of different density during the vegetative season; 2. Assess the similarities and differences in the seasonal rhythm of the plant in plantings of different density; 3. Describe the plant's population responses to the change of the climatic factor (total average daily temperature, total daylight longitude, total amount of precipitation).

The concept of «Polycentric Plant Model» was formulated by me and presented in publications (Fedorova, 2016, 2018). The concept allows a new approach to the differentiation of the plant body into 4 elements, which are not organs, as in the generally accepted concept «Morphological model of the plant», but morph-functional centers. Each element of the model in the plant's body is assigned a specific function (or several). This is the formation of: 1) assimilation system or an absorption system for an organic solution; 2) systems, ensuring the development of shoots, and in plants capable of vegetative propagation, the development of a system for providing vegetative propagation products; 3) mineral solution suction systems; 4) system, ensuring the development of generative reproduction products. The following are the elements of the model with the indication of the main function (MF) and additional function (AF) in accordance with the presented numbering: Organic-nutrition center (MF 1, AF 2,

3); Mineral-nutrition center (MF 3, AF 1, 2); Shoot-formation center (MF 1, 2 AF 3); Generation center (MF 4, AF 1, 2, 3).

F. vesca plant from the category of life forms "Stolon-forming perennial herbaceous." Stolon is part of a modified inflorescence. Stolon has a plagiotropic growth direction. In the morphological structure of the stolon, the zone of extension is replaced by the zone of inhibition. A knot with a scale-like leaf, one lateral kidney and accessory buds capable of forming roots is formed in the stretch zone. In the zone of inhibition, a node is formed with an assimilating leaf, lateral and adventitious buds, capable of forming both roots and shoots. Stolon ends its growth when the apical bud changes its growth direction from plagiotropic to orthotropic. This plant can form several shoots on the shoots of various types: rosette shoot; epigeogenous orthotropic rhizome; braking section on stolon. This plant is able to form several centers of mineral nutrition in the zone of formation of the root system of the accessory type on the shoots of various types: rosette shoot; epigeogenous orthotropic rhizome; stretching or braking on the stolon. This plant is able to form generation centers at the ends of the orthotropic branches of the shoot, originating from an apical or lateral bud formed on a rosette shoot or in the stagnation zone on the stolon. At different stages of ontogenesis, the plant organism chooses one of the development options: to strive to form several centers of shoot-forming and mineral nutrition and to form at least 1 generation center, or not to strive for it.

On May 30, 1996, *F. vesca* plants without stolon and generation center were selected from pure shrub-strawberry phytocenosis and transplanted to 12 fixed sites (1 x 1 sq.m each) to create a model population system. There were 3 variants of planting on the density of plants on the soil: 1, 5 and 9 sp./sq. m (4 replications). The soil is sod-podzolic medium loamy. In the process of observing the plants, every 2 weeks from June to October, indicators characterizing the polycentric system of the plant were taken into accountthe number of:generation centers and mineral-nutrition. shoot-formation centers on stolon; as well as the number and length of stolons. Experimental data was statistically processed in Microsoft Excel using the «Analysis Package: Descriptive Statistics». Climate data is taken from observatory reports. To identify the dependencies of plant parameters from climatic parameters, graphs were constructed using the «Scatter diagram» with the selection of the most reliable approximation. The diagrams show the trend lines, the equation for the dependence of "y" on "x" and the coefficient of confidence R^2.

Based on the analysis of these results, the following conclusions were made:1) the climatic factor in the seasonal rhythm of the plant plays a key role; 2) plants, depending on the sum of temperatures, precipitation and hours of daylight, develop according to a polynomial law; 3) the density of planting is essential for the development of a polycentric system. This is confirmed by the fact that in the polynomial equations that describe the approximation line for planting options, different coefficients are required.

EXPERIMENTAL RESULTS WITH *FRAGARIA VESCA* L. (ROSACEAE) IN THE CONCEPT «POLYCENTRIC PLANT MODEL»

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In the studies discussed the concept of «Polycentric Plant Model». The results of the experiment with *Fragaria vesca* L. (Rosaceae) are presented, which were collected in 1996 at the Biological Station of Kazan University. The climatic factor in the seasonal rhythm of the plant plays a key role. Plants, depending on the sum of temperatures, precipitation and hours of daylight, develop according to a polynomial law. The density of planting is essential for the development of a polycentric system.

Key words: *Polycentric Plant Model, Fragaria vesca, density of planting.*

ВЛИЯНИЕ СЕЗОННЫХ ИЗМЕНЕНИЙ НА КЛЕТКИ ЛЕЙКОЦИТАРНОГО РЯДА У *LASIOPODOMYS BRANDTII* В МОНГОЛИИ

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Environmental changes, seasonal variables, temperature differentiation is leading to the change of physiological parameters and behavior on the mammals. These changes are affecting for the individual's activity, mortality as well as survivable of the population. Especially, Mongolia has four seasons and extreme climate. That's why wildlife species of Mongolian must adapt for the immediate change of climate.

To date, few studies are published on the relationship between seasonal variation and immunology of hibernation mammals. Some of them noted as during the period of hibernation, decreasing body weight, heart rate, metabolism rate and body temperature same as environmental temperature (Hellgren et al., 1993; Yasuma et al., 1997; Anderson et al., 2000). Hematology tests are might bemost useful assay to predict these causes of complex physiological process. In wildlife physiological studies, the rationale for using blood rather than other body fluids and tissues is that sampling blood is minimality invasive technique without animal mortality, providing both ethical and scientific benefits.