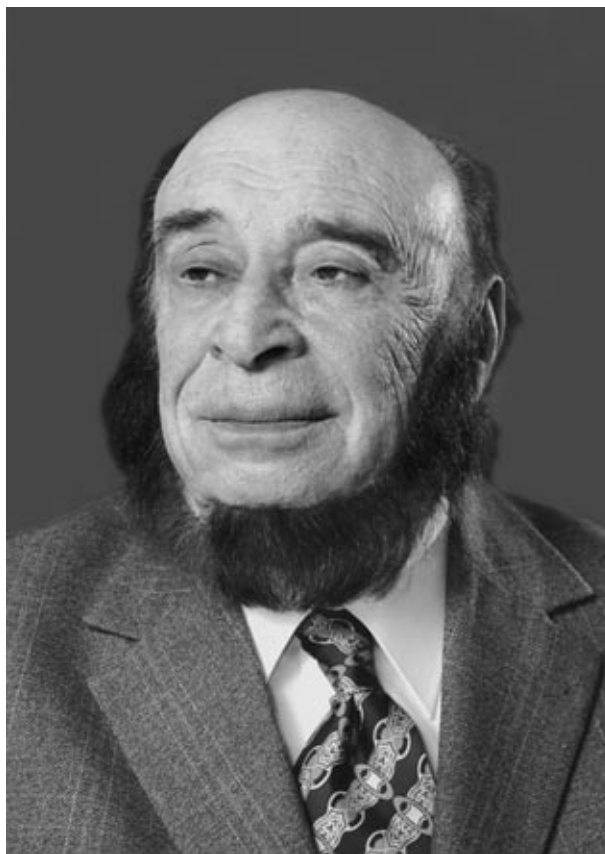


75th Birthday of Dmitrii Grigor'evich Zvyagintsev

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In March 2007, Dmitrii Grigor'evich Zvyagintsev, Doctor of Biological Sciences, Professor, Head of the Department of Soil Biology, Moscow State University, Member of the Russian Academy of Natural Sciences, State Prize Winner, and Russian Federation Honored Scientist, will celebrate his 75th birthday.

Zvyagintsev was born in Moscow. In 1955, he graduated from the Department of Soil Biology of Moscow State University. All his creative activities have been connected with the Department of Soil Biology, Moscow State University. At this department, he took a postgraduate course under the supervision of N.A. Krasil'nikov, a corresponding member of the USSR Academy of Sciences, defended his candidate's dissertation, and began his career as a laboratory assistant, subsequently progressing to junior researcher, senior researcher, and finally professor. Since 1973, he has been in charge of the University's Department of Soil Biology.

Dmitrii Grigor'evich is a specialist in the field of soil microbiology, soil biology, biotechnology, and ecology, and the author of more than 450 scientific articles, seven monographs, the classical university textbook *Biologiya pochv* (Soil Biology) (2005), and five manuals. Zvyagintsev's works are well-known in the world of science.

Together with his colleagues at the Department and postgraduate students, Zvyagintsev has worked on a broad range of scientific problems, many of which are of great importance.

An important direction in Zvyagintsev's works is devoted to adhesion (adsorption, immobilization) of microbial cells on solid surfaces, especially on soil particles and aggregates. He studied in detail the regularities and the mechanisms of adhesion and the relationship between adhesion and the taxonomic position of bacteria, their age, and medium composition; he determined the magnitude of adhesion forces, and developed

methods for desorption of cells from surfaces. He established that the biochemical activity of adhered cells is determined by the specificity of the conditions at the interface of the liquid and solid phases. Most of the cells and microcolonies in soil are adhered, which strongly influences their activity and prevents them from being washed out from soil into ground waters. Adhesion in soils is of great ecological importance; it promotes the presence of cells in favorable ecological niches and provides for their attachment to solid insoluble nutritive substrates, such as cellulose, lignin, and humus. Zvyagintsev is a recognized authority in this field; research directions pioneered by him have developed into important areas in microbial ecology and biotechnology. His monograph *Vzaimodeistvie mikroorganizmov s tverdyimi poverkhnostyami* (Interaction of Microorganisms with Solid Surfaces) (1973) was awarded the Lomonosov Prize, instituted by Moscow University.

The direct microscopic method for studying soil microorganisms by means of luminescence microscopy in reflected light, developed by Zvyagintsev, allows microbiocenoses to be examined in soil suspensions and directly in sections of soil or its aggregates. The biomass of microorganisms in soils was determined. It proved to be very large, constituting several tenths of the net primary production of plants; the fungal biomass appeared to prevail in total microbial biomass. Methods for differentiating between living and dead cells directly in a soil suspensions have also been developed.

An original line of Zvyagintsev's research is the specifics of soil as a habitat of microorganisms. He has formulated the basic principles and concepts of the structure and functioning of the soil microbial complex (the concept of soil as a multitude of microhabitats, the concept of microbial pool and the concept of the pool of microbial metabolites, the principle of nonsaturation of soil with microorganisms, the principle of doubling, etc.). Not only do these concepts explain a number of specific phenomena in soil, but they also make it possible to predict and control the behavior of the microbial complex upon changes in the environmental conditions. The results of these investigations were summarized in the monograph *Pochva i mikroorganizmy* (Soils and Microorganisms) (1987), awarded the Winoogradsky Prize, instituted by the USSR Academy of Sciences. The concept of nonsaturation of soils with microorganisms offers wide prospects for introducing the necessary microorganisms into soil. The principle of doubling explains the great stability of the functioning of the soil microbial complex: this system is more stable in terms of its functions than in terms of its structure. Soil is a multitude of microhabitats with quite different conditions, due to which the soil's gene pool is much richer than that of other natural substrates. In soils, an enormous pool of microorganisms has been discovered, most of which remain in the state of anabiosis for long periods of time and are activated only

when it is necessary to return the system to the state of homeostasis. Important regularities of the kinetics of the growth of microorganisms in soil have been revealed.

The study of the role of microbes in planetary soil functions was a logical continuation of the subject of the soil-microbial interactions. Zvyagintsev and his team described and analyzed the involvement of soil microorganisms in numerous biocenotic functions of soils. The results of these investigations were included in the joint monograph *Strukturno-funktsional'naya rol' pochvy v biosfere* (The Structural and Functional Role of Soil in the Biosphere) (1999). In 2001, Zvyagintsev won a State Prize for the cycle of works *Funktsional'no-ekologicheskie osnovy izucheniya, okhrany, povysheniya plodorodiya pochv i ratsional'noe ispol'zovanie pochvennykh resursov* (The Functional and Ecological Bases of the Study and Protection of Soils, Improvement of Soil Fertility, and Rational Use of Soil Resources).

Zvyagintsev was the first to develop systematically, from the positions of general ecology, the ecology of microbial cells in soil and the ecology of microbial populations in soil. The study of the ecology of communities of microorganisms, including bacteria, actinomycetes, fungi, and yeasts, was given a mighty impetus (*Strukturno-funktsional'naya organizatsiya mikrobnnykh soobshchestv* (The Structural and Functional Organization of Microbial Communities), 1999). In this work, Zvyagintsev investigated vertical stratification of microorganisms in terrestrial ecosystems, from tree tops to the lower soil horizons and underlying layers. It was shown that, in various strata, microbiocenoses are strikingly different and form a conveyor for utilization of dead organic matter and conversion of a number of inorganic compounds, ensuring the purity of ground waters under natural conditions. Studies of the ecological and geographical distribution of microorganisms were conducted. New ecological parameters of microbial biodiversity were developed on the basis of which the structure of microbial soil communities was characterized. Microbial species dominant in different soil types were revealed. Distribution of dominants in the main zonal and intrazonal soil types was investigated (*Pochvy i mikrobnnoe raznoobrazie* (Soils and Microbial Diversity), 1996). The influence of a number of anthropogenic factors (contamination with petroleum products, pesticides, heavy metals, allochthonous microorganisms) on the structure of microbiocenoses was studied (*Mikroorganizmy i okhrana pochv* (Microorganisms and Protection of Soils), 1989).

It was established that, in permafrost and buried soils, microorganisms retain viability for millions of years, which was noted in *Guinness Book of Records* (1991) as the longest survival of organisms on Earth.

It was shown that fungal rather than bacterial biomass constitutes the bulk of microbial biomass in soils (*Mikrobnaya biomassa v pochvakh* (Microbial Biomass

in Soils), 1995). The important role of fungal melanoproteins in the genesis of humic acids in soils was established. Extensive research into the ecology of soil fungi has been done. The low nitrogen-fixing activity of soils was explained: nitrogen fixation is known to be carried out only by bacteria, while the bulk of plant residues and the energy contained in them is utilized by fungi (*Perspektivy razvitiya biologii pochv* (The Prospects of the Development of Soil Biology), 2001). The ecology of actinomycetes, including the so-called rare genera, has been studied in different types of soils (*Ekologiya aktinomitssetov* (The Ecology of Actinomycetes), 2001). This work was awarded the Lomonosov prize (2005) and the Vil'yams prize (2003).

It has been proposed that soil microcosms are promising models for studying soil microbial complexes and their functions. These investigations allowed a number of important regularities in the dynamics of microbial populations in soil to be established and microbial succession under changing environmental conditions (moisture content, temperature, nutrient sources, pH, etc.) to be studied. It has been shown that microbiocenosis undergoes a number of developmental stages and that certain features of these stages depend on the conditions under which the succession occurs (*Mikrobnaya suksessiya v pochvakh* (Microbial Succession in Soils, 1995)).

Being in charge of the department for 34 years, Dmitrii Grigor'evich has created a school of soil microbiologists and ecologists and shaped a new profile in training specialists in the field of soil biology.

Currently, eleven doctors and fifteen candidates of biological science work at the department. They carry on research into various fields of soil microbiology, which contributes to in-depth and extensive teaching.

Prof. Zvyagintsev has developed a number of new lecture courses. He has delivered lectures at universities in Japan, Slovakia, and Cuba.

The department has trained about 500 specialists in microbial ecology and 180 candidates of science; fifty-five candidate's dissertations have been written under Zvyagintsev's scientific guidance and supervision, and fifteen of his disciples have been awarded doctoral degrees.

Prof. Zvyagintsev carries on extensive scientific and organizational work. The Soil Biology Department systematically organizes conferences and symposia on soil microbiology. Zvyagintsev has been chairman of the Soil Biology Committee of the Dokuchaev Society of Soil Scientists for 25 years. He was vice-president of the Soil Biology Committee of the International Society of Soil Scientists, chairman of the Moscow department of the All-Union Society of Microbiologists, and worked for a long time as chairman of the Moscow State University's Dissertation Council for microbiology and agrochemistry. He is a member of several Academic Councils, Deputy Assistant Editor of the journal *Vestnik Moskovskogo Universiteta. Series 17: Pochvovedenie* (Herald of Moscow University. Series 17: Soil Science), and a member of the Editorial Board of the journals *Mikrobiologiya* (Microbiology) and *Pochvovedenie* (Soil Science).

We heartily congratulate Dmitrii Grigor'evich on his jubilee and wish him good health, many years of happy life, well-being, and success in his activities and creative explorations.

*The Editorial Board of the journal
Mikrobiologiya (Microbiology)*