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BOOK REVIEW

G.M. Zenova and D.G. Zvyagintsev, *The Diversity of Actinomycetes in Terrestrial Ecosystems*, Moscow: Mosk. Gos. Univ., 2002, 132 pp.

The monograph of G.M. Zenova and D.G. Zvyagintsev, *The Diversity of Actinomycetes in Terrestrial Ecosystems*, summarizes the results of investigations into the diversity of soil actinomycetes, which were performed in the last few years by these well known researchers in the field of soil microbiology. The monograph consists of six chapters, which describe the methodological aspects of evaluation of the diversity of soil actinomycetes, present the results of investigations of polysporous, sporangial, monosporous, and oligosporous actinomycetes inhabiting soil, and consider acidophilic actinomycete complexes in soils and actinomycete diversity in the main soil ecosystems of Mongolia.

The chapter devoted to the methodological aspects of investigation of the diversity of actinomycetes in terrestrial ecosystems describes nonstandard methods and selective media that allow the abundance of actinomycetes in different types of soil to be estimated, taxonomically close and rare genera of actinomycetes to be isolated, and the habitats of particular actinomycetes to be determined. The authors give diagnostic keys for the tentative identification of actinomycete genera based on the chemotaxonomic markers (the type of the cell wall and the composition of some diagnostically valuable sugars) and the morphological characteristics of the isolates. Some of the most frequently isolated soil actinomycetes are described.

The following two chapters give a full account of the regularities of the distribution of actinomycetes of the genera *Streptomyces, Micromonospora, Streptosporangium, Saccharopolyspora, Saccharomonospora, Nocardia, Actinomadura, Microbispora, Microtetraspora, Thermomonospora*, and *Nocardiopsis* in various biogeocenoses, from the forest and steppe ecosystems of Russia and the Ukraine to the semiarid soils of Turkmenistan and the intrazonal alluvial and peat soils of Russia and Mexico. These investigations were carried out using succession analysis and various qualitative and quantitative ecological indices.

The succession analysis of soil actinomycete complexes showed that the population densities of different actinomycete genera are maximum at different stages of succession initiated by soil wetting. For instance, the population density of micromonosporas was found to be maximum in the intermediate stage of succession, whereas that of streptomycetes is maximum at the early and late stages. The succession analysis allows the dynamics of the taxonomic composition of soil actinomycetes to be directly observed in their natural habitats. The authors characterized the population dynamics of streptomycetes and micromonosporas in soil with respect to the number of their spores and the amount of their mycelia, determined the type of their ecological strategy, and elucidated the ecological status of rare actinomycete genera (*Micromonospora, Streptosporangium*, and others). Under certain conditions dependent on the type of soil and the succession stage, the abundance of the rare genera of actinomycetes in soil may reach that of streptomycetes and even exceed it.

The systemic analysis of the role of actinomycetes in the step-by-step degradation of recalcitrant organic compounds in soil showed that particular stages of this process are implemented by particular mycelial prokaryotes, which occupy certain spatial and temporal positions in ecosystems in accordance with their adaptation to the terrestrial environment, the properties of their mycelium and spores, their ecological strategy, and their relation to other actinomycete genera. The econiches of typical soil actinomycetes are determined. For instance, actinomycetes of the genus *Micromonospora* inhabit nutrient-rich substrates with a high content of plant detritus and a high moisture content; actinomycetes of the genus *Streptosporangium* inhabit the mineral horizons of acid forest soils; actinomycetes of the genus *Actinomadura* are typical inhabitants of neutral and slightly alkaline substrates with a low moisture content containing organic substances at the early stage of their decomposition (such as peats, the L and F horizons of the forest floor, and Ad horizons); and actinomycetes of the genus *Microbispora* usually inhabit plant substrates.

A separate chapter deals with the ecology of acidophilic actinomycetes. The authors revealed an acidophilic actinomycete complex in acid and neutral soils. These actinomycetes can be isolated using slightly acid medium. In mild alkaline soils, acidophilic actinomycetes are few in number, if any. The proportion between the numbers of actinomycetes detected using neutral and acid media is different in different soils. This proportion (or the acidophilicity coefficient K_{ac}) is less than 1 for slightly alkaline soils, close to 1 for neutral soils, and more than 1 for acid soils. The acido-

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philic actinomycete complex includes streptomycetes and micromonosporas.

The last chapter describes the diversity of actinomycetes in the main soil ecosystems of Mongolia. Soil actinomycete complexes in Mongolia have a specific composition, which is due to the specificity of climatic conditions and soils in Mongolia.

The information presented in the monograph is of great importance as it adds to our knowledge of the actinomycete diversity in nature and provides further insight into the ecological status of actinomycetes isolated from soil and plant substrates. This information may aid in searching for actinomycetes with promising biotechnological properties.

The book is intended for soil scientists, agrochemists, and microbiologists who are interested in actinomycetes. It may also be used as a treatise by students studying soil science, ecology, microbiology, and agrochemistry.

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