

The purpose of proposed research is important for understanding forest biodiversity in vertical scale. Biodiversity is very important for functioning forest ecosystems, but so far spatial distribution of organisms in this ecosystem is not known. Biodiversity studies have been mostly carried out on the horizontal scale, and a great proportion of organisms, especially invertebrates, occur in forests in the vertical gradient, i.e. from the soil to the canopy.

Water bears (Tardigrada) are a small invertebrates (50 – 2100 μm), as a group are cosmopolitan organisms which inhabiting almost all ecosystems throughout the world. Water bears are a diverse group and up to now 1,200 species were described. Within this group are species which prefer different habitats (e.g. hot and dry or humid). According to this, they are perfect animals to demonstrate how biotic and abiotic factors, which form a densities and species richness invertebrates in vertical configuration of forest. Additionally, Tardigrada was chosen as research object since the members of this taxon spend all stages of their life cycle on specific height of tree trunk and contrary to other invertebrates they do not migrate in vertical manner.

Research performed in natural habitat of mixed forest will be based on vertical transects, on 20 of trees and repeated six times during the year. Moss samples containing tardigrades will be collected one by one along the entire tree trunk from its base to its upper branches and surface of each sample is the same. Simultaneously, environmental factors data (temperature, humidity, etc.) will be collected in place where samples collected. Additionally, will be carried out field experiment, which will consist in putting patches of sterile moss (no invertebrates) on trees. The moss use in field experiment will be reproduced in vitro methods under in laboratory conditions, thus I will obtain sterile, free of invertebrates moss. Next, I will make observations on colonization of new habitat by tardigrades, depending on factors influencing colonization. Due to this operations it will be possible to describe relation between population parameters and factors influencing them. Next task will be form predictive map of water bears distribution. In this task will be used earlier described relation between tardigrade population and environmental factors. In this way will got predictive map of invertebrates vertical distribution. It allows to answer the question about reproducibility of density and species richness on given high. Consequently, it allows better understanding of invertebrates communities functioning not only in horizontal but also vertical distribution.

Moreover, ecological significance planned researchers are significant for water bears. Tardigrades inhabiting epiphyte bryophytes and lichens (that cover the tree trunks) have been studied quite frequently, there is absolutely no research on their accurate distribution in the vertical structure in such habitats. In the most cases research has focused on taxonomy analyses and/or searching relationship between Tardigrada species of trees and epiphytes species, which they inhabit. Therefore understanding the mechanisms which changing species diversity, distribution, phenology (occurrence of new, active specimens after winter period) and densities of terrestrial Tardigrada, may be decisive for understanding the ecology of small invertebrates which are one of the basic components in the entire forest's functioning.