The basic aim of the project is to study the symbiotic microorganisms of leafhoppers belonging to two closely related subfamilies: Typhlocybinae and Eurymelinae (Hemiptera, Cicadomorpha, Cicadellidae). Since the Typhlocybinae is regarded as the only group of leafhoppers that does not harbor symbionts, I intend to determine whether all of the Typhlocybinae species, selected for the research do not have symbionts, whereas members of the closely related subfamily Eurymelinae live in mutualistic associations with bacterial and fungal microorganisms. I would like to study the relationship between the occurrence of symbionts in these two subfamilies and the ecological niches which they occupy.

As a rule, leafhoppers (the common name for species from the family Cicadellidae) feed on plant sap – phloem or xylem from grasses, shrubs and trees. Since the diet of these hemipterans is devoid of essential nutrients, they are host to symbiotic microorganisms (bacteria and/or fungi) which are responsible for providing missing substances. Typhlocybinae is the second largest subfamily of the family Cicadellidae. A recent sampling of tropical faunas indicates that most species of Typhlocybinae remain undescribed, so this taxon can be far larger than any other leafhopper subfamily. The Eurymelinae is the most closely related subfamily to the Typhlocybinae. This research will make it possible to determine the composition of endomicrobiomes in insects of various species from many populations. Since the common ancestor of Typhlocybinae and Eurymelinae leafhoppers was probable a host of symbionts, I will focus on the reasons behind the loss of these symbiotic microorganisms in Typhlocybinae insects.

It is well known that symbiosis plays an important role in the ecology and evolution of both partners, symbiont and host-insect. Moreover, symbionts are considered to have a significant impact on the ecological niche of their host. Recent studies have suggested that symbiotic microorganisms may affect their host response toward abiotic stressors, such as changes in temperature or humidity. In the era of rapid environmental changes, understanding these relations seems to be crucial for the protection of biodiversity. I expect that project will answer the question of whether only a different diet of these leafhoppers is associated with the loss of symbionts. Project research will verify whether leafhoppers belonging to different subfamilies, characterized by the presence or absence of different symbionts are equally sensitive to future climate change.

The project is of novel nature, due to the following points: (1) Typhlocybinae and Eurymelinae insects have not yet been investigated with regards to symbiotic systems; (2) these insects are a group of large economic importance, and many of them are pests of plants or vectors of plant pathogens; (3) the phylogeny of these leafhoppers is still subject to discussion. The project is innovative because it concerns the ecology and evolution of the poorly examined subfamily of Typhlocybinae, as well as the closely related subfamily of Eurymelinae. The project will include research on microbiomes of both groups, it will combine molecular, histological, ultrastructural and statistical methods.