Symbiosis between microorganisms and insects is widespread in nature. It is estimated that more than 15% of insects are associated with microorganisms (bacteria and/or yeast-like microorganisms) necessary for their proper growth and development. **It is known that insects which feed on plant sap (phloem or xylem) compensate their poorly balanced diet (deficient in protein and amino acids), by the occurrence of the intracellular symbionts which synthesize and provide them lacking nutrients.** The symbiosis between insects and their symbiotic microorganisms is an example of a mutualistic relationship because both insects are unable to survive without their symbionts and the symbionts have also lost their ability to live out of the host insect organism.

Among hemipterans, one large and diverse group is Auchenorrhyncha which is classified in two suborders: Cicadomorpha (cicadas, leafhoppers, treehoppers, spittlebugs) and Fulgoromorpha (planthoppers). So far the symbiotic systems of Cicadomorpha have been analyzed extensively, whereas the data concerning symbionts of Fulgoromorpha are only fragmentary. **The research carried out has indicated that the symbionts of planthoppers may be both bacteria and yeast-like microorganisms which complement each other with respect to the synthesis of nutrients necessary for the host insect.** Symbionts are usually localized in the cytoplasm of large, polyploid, mesodermal cells termed bacteriocytes which occur in the close vicinity to gonads. It is believed that the beginning of the association between Auchenorrhyncha and microorganisms took place more than 270 mln years ago when the auchenorrhynchan's ancestor has been infected by two different bacteria: bacterium *Sulcia* (phylum: Bacteroidetes) and betaproteobacterium (phylum: Proteobacteria). During further evolution occurred a replacement of symbiotic bacteria by other microorganisms (bacteria/yeast-like microorganisms) resulting in the significant diversity of symbiotic systems in the various evolutionary lineages of Auchenorrhyncha. For example, such symbiotic bacteria as *Sulcia* (Bacteroidetes), *Zinderia* (Betaproteobacteria), *Baumannia* (Gammaproteobacteria), *Hodgkinia* (Alphaproteobacteria), *Arsenophonus* (Gammaproteobacteria) and *Sodalis* (Gammaproteobacteria) have been revealed to exist in Cicadomorpha.

The aim of this project is a complex analysis of symbiotic systems in Fulgoromorpha with particular emphasis on symbiont replacement during the evolution of this group of insects. The planned research will include: (1) the definition of the complexity of the symbiotic system of Fulgoromorpha; (2) the identification of the symbionts of the examined species of planthoppers; (3) the analysis of symbiont replacement during the evolution of host insects with particular emphasis on the replacement of symbiotic bacteria by yeast-like symbionts; (4) the sequencing of the genomes of Fulgoromorpha symbionts and their comparative analysis; (5) the description of modes of symbiont transmission from one generation to the next; (6) co-phylogenetic analysis of host insects and their obligate symbionts.

The results obtained while carrying out the project submitted will allow us to better understand the symbiosis phenomenon and will provide the new data concerning the evolution of symbiotic systems of insects.