LITHUANIAN UNIVERSITY OF HEALTH SCIENCES

International **Summer School** Practice

Investigation of Genetic Markers Associated with Immunity in Honey Bee Population

Honey bees (Apis mellifera) are important pollinators and play a major role in maintaining ecosystem stability and agricultural productivity. Their health and survival are influenced by multiple interacting factors, including pathogens, environmental conditions and genetic variation. Understanding the genetic basis of immune responses may contribute to a better understanding of honey bee health and the mechanisms underlying differences in susceptibility to infections.

The proposed research project will focus on the investigation of genetic markers associated with immunity in honey bee populations. The main aim of the project is to investigate genetic variation in selected immune-related markers and evaluate their potential associations with honey bee health and susceptibility to viral infections.

During the research internship, the student will be introduced to the principles of molecular genetics and population genetics and will participate in laboratory-based research. The practical work may include DNA and RNA extraction, assessment of nucleic acid quality and concentration, polymerase chain reaction (PCR), genotyping of selected genetic markers, and real-time quantitative PCR (RT-qPCR) for analysis of immune-related gene expression. Depending on the project progress and sample availability, viral infection status may also be assessed using molecular diagnostic methods. The student will learn basic approaches for processing and interpreting molecular genetic data, including genotype and allele frequency analysis and evaluation of associations between genetic markers, immune responses and infection status.

The project will provide practical experience in molecular biology and genetics techniques and introduce the student to the workflow of experimental research, from sample preparation and laboratory analysis to data processing and interpretation. The internship will also develop skills in scientific literature analysis, research data management, statistical analysis and scientific reporting.

The project is intended to provide an opportunity for an international student to gain hands-on experience in a research laboratory while contributing to ongoing studies of honey bee genetics, immunity and health. The obtained results may contribute to a better understanding of genetic factors involved in honey bee immune responses and provide a basis for further research into genetic markers associated with disease susceptibility and resistance.