

## **In the search of new insecticides: immunomodulatory role of tachykinin-related peptides and their potential usage in pest control**

Insects are the most numerous groups of animals in the World. For this reason, they significantly influence our life and environment, including food production. Despite invaluable role of insects as pollinator, also many species are classified as pests. Huge economical losses related to activity of pest species, constantly increasing of human demand in food production and climate changes, force developing novel, biosafe way of crop protection. For many years, high hopes are associated with usage of insect neuropeptides. One of the largest groups of these compounds are tachykinin-related peptides (TRPs). TRPs participate in insect in regulation of many life processes, including development and reproduction. Due to their modulatory role, these neuropeptides and agents which influence on TRP-signalling are considerate as a potential novel insecticide.

Our previous research carried out under the cooperation with Prof. Jens Rolff from Freie Universität Berlin, showed that TRPs can also modulate activity of the insect immune system. Despite the knowledge about the influence of TRPs on basic immune response, the detailed mechanism of immunomodulatory action is still unknown. For this reason, the main aim of the project is complex evaluation of changes observed in immune-related cells after application of TRPs and changes in insect neuroendocrine system during pathogen infection.

Despite detailed analysis of properties of novel agents for pest control, equally important is developing appropriate ways of their delivery to insect body. In recent years, interest in using RNAi (interference RNA) in pest management has increased. Delivery to insect body dsRNA (double-strand RNA), which are the basis of this technique, lead to “silencing” targeted genes, for example very important for normal functioning of specific pest species. Moreover, current research showed that dsRNA can easily penetrate insect cuticle and also may be delivered to the insect body with food. Due to these, despite evaluation of detailed role of TRP on insect immune system, the equal important part of the project will be analysis of potential usage of dsRNA targeting genes encode TRP precursor and receptor on one of common storage pest, mealworm beetle *Tenebrio molitor*. For this purpose, we will analyse the influence of topical and oral application on survival ratio, fertility, fecundity, and immune system activity of tested beetles.

Due to the high complexity of the project, the research concerned hormonal regulation of the insect immune system and potential usage of RNAi technique in pest control will be valuable for searching for new, biosafe and specific insecticides.