PP-092 [Bee Health]
Biological distribution of honey bee vitellogenin and its fragments in bee organism

Eva Hrtánková, Silvie Dostálková, Jiří Danihlík, Marek Petřivalský
Department of Biochemistry, Palacký University, Olomouc, Czech Republic

Vitellogenins (Vg) are a group of proteins primarily associated with yolk formation in oviparous animals and insects, serving as precursors to storage proteins. Honey bee vitellogenin is a monomeric 180 kDa phospholipoglycoprotein, which can be cleaved into smaller fragments of 150 kDa and 40 kDa. In honey bees, Vg is one of the most abundant proteins in the haemolymph, with multiple biological functions beyond nutrition, including involvement in social organization, antioxidant protection, immunity or lifespan regulation. Despite recent advances, the precise mechanisms underlying these functions remain poorly understood. While in most organisms Vg is predominantly found in the ovaries of females, it is present in several other body parts in honey bees. Vg is crucial for winter bees as an essential biomolecule for the activation of immune response. Given the pivotal role of Vg in lifespan regulation and antioxidant defence, understanding its action in various body parts is essential for developing strategies to support honey bee health under challenging environmental conditions. Additionally, as Vg can bind several molecules, including pathogens, this research may enhance our understanding of its immune properties and contribute to implementation of these properties into beekeeping practice.

This study aimed to investigate the distribution of Vg in various honey bee tissues, including the brain, hypopharyngeal glands, digestive system, fat body, haemolymph or ovaries. The Western blot technique was employed to detect and relatively quantify Vg. Prior to immunodetection, two protein separation methods were applied: isoelectric focusing (non-reducing) and SDS-PAGE (reducing), which are most commonly used for protein separation in polyacrylamide gels. The results demonstrate that Vg is present in almost every body part of the honey bee, with varying distribution patterns of its fragments, which may suggest distinct functional roles for each fragment. These findings offer valuable insights into the diverse roles of Vg in honey bees. Deepening the knowledge about the biological functions of Vg can help to understand and emphasize the importance of protein supplementation in beekeeping, especially for overwintering bee populations.

This research was funded by the MŠMT of Czech Republic, grant LUAUS24085.