

Vitellogenin has a regulatory function in honey bee workers, as revealed by iRNA.

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tionally sterile honey bee workers synthesize the conserved yolk precursor vitellogenin while they perform nest tasks inside the colony. The subsequent shift from nest tasks to foraging is linked to reduced production rates of vitellogenin, concomitant with an increase in the juvenile hormone (JH) titer. JH is regarded as the principal controller of vitellogenin expression and behavioral development in the bee. Yet, here we show that suppression of *vitellogenin* gene activity by RNA-interference causes a significant increase in the JH titer. A dynamic regulatory effect of vitellogenin on the endocrine system has rarely been reported in other insects. In order to map out the downstream effect of the regulatory association between vitellogenin and JH, we analyzed the expression level of *ultraspiracle (usp)*, which is an essential component of the ecdysone response and a strong candidate JH receptor. In honey bees, *usp* expression was recently shown to be rapidly upregulated by a JH analog. Thus, we experimentally tested *usp* expression in workers with strongly contrasting relationships between vitellogenin and JH, i.e. individuals with high vitellogenin titer and low JH level in the control group, and individuals with low vitellogenin titer and high JH level in the experimental RNAi group, respectively. We found an approximately 45 % increase in the level of *usp* expression in the knockdown bees. This result suggests that *vitellogenin* knockdown causes an operational increase in the JH titer, indirectly inducing a reinforced transcriptional response in a nuclear receptor implicated in the JH response in target tissues. Thus, our finding that vitellogenin expression is not only regulated by JH but itself is a controlling factor of the JH titer, provides a new facet in the current knowledge of the evolution of social insects and our understanding of social insect evolution. Financial support: FAPESP