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CORRESPONDING AUTHOR

Elena Facchini

elena.facchini@unimi.it

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Expression monitoring of relevant sensitivity genes in honey bee antennae and their relationship with Hygienic Behavior

Elena Facchini^{1*}, Francesca Dell'Orco¹, Michele Mortarino¹, Rita Rizzi¹

¹University of Milan, Department of Veterinary Medicine, Italy

Abstract

Honeybees are very important microlivestock, not only for the economic value of their productions but also for the crucial role they fulfill as pollinators. Recently, colony losses have been recorded throughout Europe and the reasons underpinning such phenomenon can be addressed to agrochemicals and pathogens. Among the latter, the parasitic mite *Varroa destructor* is considered the principal mortality cause. Hygienic behavior (HB) in honeybee (*Apis mellifera*) involves the detection and removal of brood affected by bacterial, fungal diseases, and parasitization. This behavior is part of a series of strategies evolved by social insects known as social immunity, which confers disease resistance thanks to the persistent elimination of pathogens and parasites from the hive, limiting their multiplication and the infection of other bees. It has previously reported that physiological changes in peripheral sense tissues of insects influence the behavioral state of individuals, and it has been suggested that changes in gene expression at antennal level can contribute to shifts in the behavioral states of honeybees (Vergoz *et al.*, 2009). Moreover, it has previously reported that antennae hold a key role in the process of recognition of abnormalities in the brood by honeybees (Mondet *et al.*, 2015). The aim of the work was to investigate the expression level of selected genes (Obp3, Obp4, Obp16, Obp18, Act5C, Mblk-1) through RealTime-PCR in honeybee antennae. These targets are reported as potential biomarkers of HB in previous transcriptomic and proteomic studies (Mondet *et al.*, 2015; Guarna *et al.*, 2015). Hygienic behavior has been measured in the field through optimized freeze-killed-brood method on 10 colonies, from which workers of known age (15 days old) have been collected for molecular analysis (Arathi *et al.*, 2000). Preliminary results show that Obp3 is the least expressed among the tested genes, but its expression pattern is linked to the HB value; in particular, highly hygienic colonies express Obp3 significantly at higher rate with respect to the lower HB group of colonies.

References

Guarna M. M., A. P. Melathoupolous, E. Huxter, I. Iovinella, R. Parker, N. Stoykov, A. Tam, K. Moon, Q. W. T. Chan, P. Pelosi, R. White, S. F. Pernal, L. J. Foster. 2015. A search for protein biomarkers links olfactory signal transduction to social immunity. *BMC Genomics*. 16, 63.

Mondet, F., C. Alaux, D. Severac, M. Rohmer, A. R. Mercer, Y. Le Conte. 2015. Antennae hold a key role to Varroa-sensitive hygiene behaviour in honey bees. *Scientific Reports*. 5, 10454.

Arathi, H. S., I. Burns, M. Spivak. 2000. Ethology of hygienic behavior in the honey bee *Apis mellifera* L. (Hymenoptera: Apidae): behavioural repertoire of hygienic bees. *Ethology*. 106, 365-379.

Vergoz, V., H. J. McQuillan, L. H. Geddes, K. Pullar, B. J. Nicholson, M. G. Paulin, A. R. Mercer. 2009. Peripheral modulation of worker bee responses to queen mandibular pheromone. *PNAS*. 106(49), 20930-20935.