

**Reproductive Dominance and Caste-specific Pheromones in the Honeybee
(*Apis mellifera*)**

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Reproductive skew, where only the queen reproduces, is a hallmark in honeybee biology. Although workers have undeveloped ovaries, they are not completely sterile and can lay unfertilized eggs, which develop into males. Under a hopeless queenless situation, dominant workers that develop ovaries more rapidly benefit from rearing their own reproductives with the help of nestmates. Queen-worker interactions in honeybees are largely mediated by pheromone, including the caste-specific Dufour's gland secretion. Queen secretion is distinguished from that of workers by possessing long-chain esters. However, egg-laying workers develop a queen-like secretion. In order to examine the

formation of reproductive dominance among workers and the role of Dufour's gland secretion in this process, pairs or single bees were placed in petri dishes for 10 days. In most pairs, one of the bees had a higher level of ovarian development, creating reproductive dominance over the other one. Most of the single bees, in contrast, did not develop ovaries. These findings demonstrate that, on the one hand, social stimulation (of at least one bee) is required for ovary development; and, on the other hand, the reproductively dominant bee inhibits ovary development in the submissive bee. Chemical analysis of Dufour's gland secretion revealed higher quantities of the queen-like esters in the bee with more developed ovaries as compared with its counterpart bee. Low levels of esters were also measured in the single bees. It appears that Dufour's gland secretion is in correlation with ovarian development but whether it contributes to dominance hierarchy formation is still unclear. (*P*)

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