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The putative role of male sex pheromones in bumblebee cuckoohost interactions

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In social insects, the high energetic costs of brood care have promoted the evolution of cheaters that exploit workers services of conspecifics or heterospecifics. In Bumblebees, all the species of the subgenus *Psithyrus* have lost their worker caste and are completely dependent on hosts to produce their sexuals. One of the most striking challenges for these social parasites is how to escape from the detection and rejection by their hosts. Many studies have shown how the *Psithyrus* queens overcome host recognition systems and successfully enter host colonies. However, once a social parasite has successfully usurped a host nest, its emerging offspring still face the same challenge of avoiding host recognition. How cuckoo offspring fool their hosts has been highly investigated in birds but poorly studied in social insects. We assume that cuckoo bumblebee females might camouflage themselves by decreasing pheromonal glands production and acquiring host nest odor. However young males already produce high amounts of species specific cephalic labial glands secretions. Host workers might be able to recognize them. Therefore, *Psithyrus* males might use another strategy to escape from workers detection, by (i) producing facilitating signals that enables them to be accepted by the host workers or by (ii) producing a chemical blend that does not appear as allospecific to the hosts.

The aim of this study is to look at how males of the cuckoo bumblebee *Bombus vestalis* fool *Bombus terrestris* workers during their intranidal life, using chemical analyses of their cephalic labial glands secretions and behavioral recognition assays.

Larval and nurse worker control of developmental plasticity in honey bee queens and workers

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Polyphenism, the expression of alternative phenotypes in response to environmental cues, is widespread and is thought to evolve via the modification of developmental plasticity. Queen-worker dimorphism in insect societies is an exemplar polyphenism that forms the basis of the reproductive division of labor characterizing eusociality. Social evolution in honey bees has produced strong queen-worker dimorphism for traits such as ovary size and body size that are sensitive to larval nutrition. Nurse workers strictly control larval nutrition and thereby regulate larval developmental trajectories and the resulting expression of queen or worker phenotypes. As a result, the honey bee developmental program includes larval components that determine plastic growth responses to the nutritional environment and nurse components that regulate the nutritional environment. We studied the contribution of these two components to variation within and between two pairs of honey bee lineages for body size and ovary size in queens and workers. The lineages differed in the degree of social control of development for body size, ovary size, and the body-ovary size relationship, and the degree of developmental plasticity for these traits in response to variation in the nutritional environment. Based on patterns in these differences, we suggest that larval and nurse genetic components were available for natural selection to act on during the evolution of honey bee queen-worker dimorphism, affecting the developmental plasticity of body size and ovary size, and allometric scaling relationships between these traits.