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Can social pheromones regulate reproduction in non-social insects?

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Insect sociality has evolved multiple times, and in each case has presumably involved a modification of regulatory mechanisms already present in solitary ancestors. It is not clear, however, how similar social and non-social taxa remain with respect to the cues and pathways used to regulate personal reproduction. In this talk we present a series of experiments that test how closely social and non-social insects regulate reproduction in response to a common social pheromone. First, we show that honeybee queen mandibular pheromone inhibits virgin *Drosophila* ovaries in much the same way as it typically suppresses worker bee ovaries. That is, flies exposed to pheromone showed a reduction in ovary size, produced fewer eggs, and generated fewer viable offspring, relative to unexposed controls. Fruit flies therefore respond to an interspecific social cue to which they would not normally be exposed. Why a non-social fly responds to a highly social bee's pheromone is not clear, but one possibility is that the social and non-social insects represented here share pathways associated with female reproduction, as predicted by the 'groundplan' hypothesis of social evolution. Second, we show that the cross-species effect of bee pheromone on fly 'sterility' depends in part on the fly's genotype. Rover flies are less responsive to ovary-inhibiting pheromone than are sitters, and this differential response parallels the response from forager and nurse subcastes of the bee. Sitter flies, like nurse bees, are apparently more sensitive to queen pheromone, and our results thus extend further the analogy between this well-known bee-fly polymorphism. Beyond implicating the foraging gene in the regulation of reproduction, our comparative experiments suggests a striking degree of functional homology between bee and fly, and highlight the potential for *Drosophila*-based models in 'socio-evo-devo' research.