



## **Reproductive partitioning in polygynous, perennial *Vespula pensylvanica* colonies**

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Transitions from colonies containing a single family to those consisting of multiple families with low nestmate relatedness can lead to intra-colony conflicts. One way these conflicts may be diminished is by differential contributions of each queen to the total reproductive output, and varied investment into workers, queens, and males. *Vespula pensylvanica* was introduced to Hawaii in the 1970s, where it exhibits a perennial, polygynous (multiple queens) life history in contrast to a largely annual, monogynous (single queen) life history in its native range along the west coast of mainland United States. By excavating nests and sampling of age-matched brood from nine invasive *V. pensylvanica* perennial colonies from Hawaii, we assess how queens within polygynous colonies differ in reproductive output overall. We use a low-density double digest genotyping-by-sequencing approach to sequence up to 48 each of worker, male, and queen brood, as well as all reproductive queens from all colonies. We determine mother-offspring relationships, whether contributions to each caste are skewed, and whether any queens lack reproductive output. Cell locations of each larva and pupa are documented, allowing us to determine whether queens are spatially segregated within the nests. This study provides the first information on reproductive differences between nestmate queens in invasive, polygynous *Vespula*, as well as the spatial configuration of eggs laid by each queen within a nest.