

OR117

Matedness does not matter in queenship formation in Polistes snelleni.

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In colonies of primitively eusocial wasps, some dominant workers become successive queens and inherit queenship after the death of the foundress queens. Although workers in many species do not mate, workers of *Polistes snelleni* are capable of mating and female production. We experimentally removed foundress queens from colonies of *P. snelleni* to evaluate the effects of queen loss on the dominant-subordinate relationships among the remaining workers and the productivity of colonies in this species. We also analysed wasps' cuticular hydrocarbons (CHCs), and compared the profiles among the females. The foundress queens were the sole egg layers in almost all of the queen-right colonies. The frequency of dominance behaviors among the wasps in the queen-right colonies was significantly less than that in the orphan colonies. The frequency of dominance behaviors in the successive queens after queen removal was significantly more than in the foundress queens before her removing. Multiple daughter workers had developed ovaries, including the successive queens in 66.7% (10/15) of the orphan colonies after the foundress queen removal. The orphan colonies produced significantly more cells and eggs than the queen-right colonies. The foundress queens possessed characteristic CHC profiles, and which were different from those of the daughter workers including the successive queens. Our results suggest that the reproductive capacity of the successive queens in the orphan colonies is not lower than that of the foundress queens, and that the productivity of the orphan colonies is maintained, irrespective of potential conflict over direct reproduction among daughter workers. The differences in the frequency of dominance behaviour and the CHC profiles between the foundress and the successive queens suggest that the successive daughter queens are not as totipotent as the foundress queens in physiological aspects. Pre-imaginal caste determination could play a role in a primitively eusocial wasp, *P. snelleni*.