

OR279*Costs and benefits of cooperation: primary polygyny in harvester ants***Jennifer Fewell, Juergen Gadau**

Primary polygyny by ant queens creates an interesting layering of social systems, with cooperative associations of nonrelatives layered over eusociality. The harvester ant species, *Pogonomyrmex californicus* has contiguous populations in which queens either found nests singly (haplometrotic) or as groups of nonrelatives (pleometrosis); pleometrotic associations continue on to become polygynous colonies. Queens of these two types can be combined into artificial social groups to test assumptions for the evolution of cooperation. We will present data suggesting that cooperative sociality at the colony founding stage provides individual fitness benefits to pleometrotic queens that are not predicted by current models of cooperation, and that these effects are mediated by social dynamics. We have found that, in the contexts of aggression and division of labor, interactions among queens generate emergent or nonlinear effects on individual queen phenotype. In particular, both conflict escalation and emergent task specialization seem to create unexpected fitness costs for haplometrotic queens. In contrast, pleometrotic queens paired together seem to benefit from potential efficiencies of task coordination. Further, pleometrotic queens may take advantage of normally solitary founding queens in mixed associations, becoming the 'cheater' by avoiding more costly tasks. These benefits of cooperation during early colony founding, however, may be balanced by constraints on individual reproductive output later at colony maturity. The collective data from colony founding to reproduction provide a unique opportunity to consider the costs and benefits of cooperative sociality across life history stages.