



Collective memory of learned foraging preferences persists across worker turnover in a tropical leafcutter ant

Author(s): Hannah Marti, Hannah Marti , Clarice Diebold , William Wcislo

Institution(s): Integrative Biology Department, University of Texas at Austin ; Smithsonian Tropical Research Institute, Panama ; Smithsonian Tropical Research Institute, Panama ; Integrative Biology Department, University of Texas at Austin

Animals living in groups can make collective decisions that pool the varying experiences and knowledge of the individuals in the group. The phenomenon of collective decision making is particularly interesting in social insect colonies in which the oldest and presumably most knowledgeable individuals are gradually replaced by newly-born, inexperienced individuals. Considering the complexity of an ever-changing workforce, we studied the persistence of learned leaf preferences in leafcutter ant colonies as they transitioned from a composition of 100% experienced workers (experienced with a particular leaf type) to 100% naïve workers (no experience with that leaf type). We tracked changes in leaf preferences in two sets of colonies that had either positive (untreated leaf) or negative (fungicide-treated leaf) experiences with experimental leaves. Leaf preferences changed as a function of the increasing proportion of naïve workers in a colony. This relationship was non-linear as experienced workers exerted a disproportionate influence over the leaf preferences of naïve workers while they were present in the colony. It was not until colonies had reached complete turnover (100% naïve workers) that initial positive or negative experience had been “forgotten” such that the two groups again had statistically equivalent leaf preferences. Surprisingly, we also found that there may be a difference in the leaf preferences of workers who have lived their entire lives in captivity, when compared with workers born in the wild. This process of worker turnover raises questions about 1) the tradeoff between the possible benefits of memory retention (stability) and memory decay (flexibility) in decision making and 2) ways in which systems that process distributed information could include elements of both stability and flexibility on ecologically relevant timescales.