Why are some ant colonies polydomous?

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Social insect colonies use a range of nesting strategies that enable their survival in diverse environments. One such strategy is polydomy, whereby a single colony is spread across multiple distinct nests that share resources including food, brood and workers with each other. Polydomy has been identified in over 170 species that inhabit a wide range of ecological niches; from subordinate scavengers with nests of a few hundred individuals to dominant aphid farmers with nest populations reaching into the hundreds of thousands, such as wood ants from the Formica rufa group. This diverse niche inhabitancy may be due to some general benefits of spreading across multiple nests, that allow polydomous colonies to outcompete monodomous colonies in certain situations. For example, occupying multiple nests may allow colonies to spread risk, to overcome structural limitations on colony size from inhabiting a single nest or to increase foraging success. Whilst there are many hypotheses for the evolution of polydomy, models testing the logic of these hypotheses are lacking. Consequently, there is still some way to go to understand why polydomy has evolved in certain species. In this talk we will present a stochastic agent-based population dynamics model that describes the behaviour of monodomous and polydomous colonies that compete for resources. We use this model to test a range of hypotheses for the evolution of polydomy. We make predictions about the relative importance of potential drivers of nesting strategy under various ecological conditions and highlight gaps in current empirical knowledge.