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Reproduction by colony fission in the ant *Aphaenogaster senilis*: an ecological perspective

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Resource and sex allocations represent two major trade offs in most organisms' life cycles that are particularly interesting to study in social insects because of the conflicts of interest they can generate among colony members. Although literature now abounds on resource and sex allocation in species reproducing by independent colony founding, much less is known of species reproducing by colony fission. In such species, young queens are helped during the first step of colony foundation by groups of workers that leave their mother colony. In ants, workers do not bear wings, which may limit dispersal and increase competition between daughter colonies. In theory local resource competition may strongly affect sex allocation, but few studies have demonstrated that local resource competition (LRC) occurs among colonies in nature.

Here, we report on a field study designed to determine whether intraspecific competition limits population density of the fission-performing ant *Aphaenogaster senilis* and whether it occurs between related colonies, two conditions for LRC at the colony level. We selected 30 18x18m plots in four populations in the Doñana National Park. In half (experimental) the plots, we removed all but one nest while the control plots remained untouched. We then mapped all the nests of the 30 plots after 1, 2, 4, 6 and 12 months. Results show a rapid and permanent recovery of population density after 4 months that might be due to a combination of migration of foreign colonies inward and to increase fission rate in experimental plots. Micro-satellite genotyping revealed a complete isolation between populations separated by a few km. Within populations, genetic distance increases with geographic distance suggesting that competition takes place between related colonies. Both field and genetic data indicate that LRC occurs among colonies of *A. senilis*, which may have important consequences on resource and sex allocations.