14-13 The influence of season and larval competition on caste fate in a fission-performing ant.

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In species that undergo colony fission, queens leave their nest with a group of workers which increases greatly their survival and success with respect to species undergoing independent colony founding. As a consequence, colonies are expected to invest massively in workers and produce only a few queens. This occurs in *Aphaenogaster senilis* in which queens are mostly produced in queenless (QL) or in large queenright nests. Although previous studies have shown that only 0.07% of the larvae develop as queens in nature; the underlying functional mechanisms that control such fine-tuning in the queen production are badly understood. We present a series of experiments that test the role of environmental conditions in determining the caste of diploid brood. First, groups of 200 QL workers were provided with an increasing number of larvae between 2 and 40. On average, 2.3±1.67 queens were produced per group, independently of the initial number of larvae. Consequently, as the number of larvae raised together increased, the probability of a given larva developing into a queen decreased, suggesting competition between the brood. However, we found that the presence of larvae already oriented toward queen development had no effect on the probability of queens production. In a second set of experiments, we showed that, interestingly, the production of queens varied greatly with the season and between colonies. Queen production in QL groups was very low in winter in spite of controlled laboratory conditions and increased in spring and summer. These data suggest that in QL condition, the production of new queens from undifferentiated larvae is influenced by numerous environmental factors, and we hypothesized, from the temporal variation of queens production, that caste determination may be affected by maternal effects.

14-14 Evolution of nesting habitats and metapleural glands in ants

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The metapleural gland is a unique and complex structure located on the propodeum of ants. Given its function in immune defence against microbes, it has undoubtedly played an important role in the ecological success of ants by enforcing colony hygiene and preventing diseases. Although this gland has an important antimicrobial function, it has been lost several times. It has been proposed that these losses are due to a shift in nesting habit, i.e. ants living in trees can afford to loose the metapleural gland because this environment harbours fewer microbes. Here we test this idea, the 'Arboreality Hypothesis', by constructing a phylogeny for 48 formicine ant species using eight markers (nuclear and mitochondrial) and Bayesian tree building methods. Character mapping for the presence/absence of the gland and nesting habitat was carried out with SIMMAP including 1000 trees from the posterior distribution of the MCMC run. Our results show several independent losses and regains of the metapleural gland across the subfamily. We also find a significant correlation between the two traits, suggesting that the 'Arboreality Hypothesis' can indeed explain the pattern of presence/absence of the metapleural gland in this group of ants.