



Do slavemaker ants lose perception?: Convergent loss of olfactory receptors along independent origins of slavery

Author(s): Evelien Jongepier, Barbara Feldmeyer, Anton Labutin, Claudia Gstöttl, Jürgen Heinze, Susanne Foitzik, Erich Bornberg-Bauer

Institution(s): Biodiversity and Climate Research Centre (BiK-F), Molecular Ecology Group, Frankfurt am Main, Germany; Westfälische Wilhelms-University, Institute for Evolution and Biodiversity, Muenster, Germany; Universität Regensburg, LS Zoologie / Evolutionsbiologie, Regensburg, Germany; Universität Regensburg, LS Zoologie / Evolutionsbiologie, Regensburg, Germany; Johannes Gutenberg University Mainz, Institute of Organismic and Molecular Evolution, Mainz, Germany; Westfälische Wilhelms-University, Institute for Evolution and Biodiversity, Muenster, Germany; University Muenster, Germany

The evolution of an obligate parasitic lifestyle often leads to genomic reduction, in particular with the loss of functions associated with host-dependence. Reductive evolution has been intensely studied in micro-parasites, which are often very distantly related to their host. Contrastingly, socially parasitic ants, like slavemakers, exploit closely related ant species, on which they rely for brood care, foraging and all other colony maintenance tasks. Such recent common ancestry allows for direct comparisons of gene family size evolution between slavemakers and their hosts. We sequenced the genomes of three slavemaker ants and their closely related hosts, each representing an independent origin of slavery. Based on these genomes we investigate convergent evolutionary patterns in olfactory gene families in slavemakers and hosts. Gustatory receptors allow ants to perceive tastants and thus likely play an important role during foraging, a task slavemakers outsource to their enslaved host workers. In support of this, we find that the genome of slavemaker ants harbor only half of the number of gustatory receptors of that of their hosts. Likewise, slavemakers have a smaller repertoire of odorant receptors, which are often implicated in the detection of nestmate recognition cues. While accurate perception of these cues is pivotal for hosts that are targeted by slavemaker ants, a reciprocal rejection of heterospecific slaves is disadvantageous to slavemakers. This may explain why hosts have retained and even expanded their odorant receptor gene repertoire while fewer copies are found in slavemakers. Thus, gene loss in slavemakers suggests that the establishment of obligate parasitism triggers the relaxation of selective constraints on perception.