11-9 GENE FLOW ACROSS THE SOLITARY-SOCIAL TRANSITION IN THE SOCIALLY POLYMORPHIC SWEAT BEE *HALICTUS RUBICUNDUS*

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Eusociality has evolved just a few times in the bees. Interestingly, some sweat bee (Halictidae) species straddle this major evolutionary transition; they are socially polymorphic, exhibiting both solitary and social behaviour. Previous studies of socially polymorphic sweat bees have suggested a genetic basis to the social transition. We have attempted to address whether there is a genetic underpinning of this transition in the socially polymorphic sweat bee *Halictus rubicundus*, which exhibits solitary behaviour in the cooler north of its European range and sociality in the warmer south, by inferring levels of gene flow among populations exhibiting solitary or social behaviour. Our population genetic data reveal subtle genetic differentiation between populations in the UK and Ireland, though the level of differentiation between social and solitary populations is no greater than expected by geography alone (isolation by distance). The only major barrier to gene flow seems to be water (the Irish Sea). These data suggest little or no reproductive isolation between solitary and social populations of *H. rubicundus*. It is more difficult to infer whether there is, or is not, a genetic underpinning to the social transition with our indirect, population genetic data. They suggest that either there is no genetic underpinning (social phenotype is a plastic response to environment) or that there is a simple genetic architecture to the switch in social phenotype.

11-10 COLONY STRUCTURE IN THREE SPECIES OF THE ANT GENUS *MYRMECIA*

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Ants of the genus *Myrmecia* have retained many biological traits that are considered to be basal in the family Formicidae. Studying these ants may provide valuable insight into the early stages of formicid social evolution. Using microsatellites, we investigated colony structure in three *Myrmecia* species, viz. *M. brevinoda*, *M. pilosula*, and a newly discovered cryptic species of the *M. pilosula* complex, *Myrmecia sp*. We observed, as a first ever for the genus *Myrmecia*, the co-occurrence of polydomy, polygyny and polyandry, in all three species. Mating frequencies of queens varied strongly within species, but the maximum frequencies were high in all of them, ranging from 9 to 12. Queens within colonies were lowly related in *M. brevinoda* and *M. pilosula*, but unrelated in *Myrmecia sp*. In *M. pilosula* and *M. sp.*, the colony founding mode could be budding, as indicated by Mantel tests. Our data for *M. brevinoda* are in support of the "genetic-variability" hypothesis that polygyny and polyandry should be negatively correlated due to their costs and the benefits of the resulting genetic variability.