



## PhD in evolutionary ecology of ants.

### **Maintenance of social and dispersal polymorphisms in the ant *Myrmecina graminicola*: phenotypic effects, mating preferences and spatially heterogeneous selection**

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Dispersal is essential for organisms to reach and colonise new sites, and dispersal strategies are of increasing scientific interest and ecological importance in a world where environmental changes are ubiquitous. Some ant species exhibit alternative dispersal strategies that involve the co-occurrence of many morphological, behavioural, and physiological traits. This is the case of the ant *Myrmecina graminicola* where queens pursue either a dispersive strategy or a competitive strategy. Queens of the dispersive strategy are winged. They disperse by flight, found colonies solitarily, and are intolerant to additional queens. Queens of the competitive strategy are apterous. They disperse over a limited distance with workers, found colonies with their help, and often accept additional queens. These alternative strategies of dispersal and colony social organisation are determined by two supergenes with two alleles each. One supergene determines whether the queen is winged (genotype WW) or apterous (WA), and the other whether the colony has one queen (monogyny, queen of genotype MM) or several (polygyny, MP). Winged queens always form monogynous colonies (WW\_MM), while apterous queens may form polygynous colonies (WA\_MP) or remain monogynous (WA\_MM).

The PhD project will build on recent studies of this species (Finand et al. 2023, 2024; Taupenot et al. in prep) using the newly acquired knowledge of supergenes determination of the dispersal strategy and social organisation. The PhD student will assess the link between the underlying genotypes and the mating choice of queens, their success at colony founding under natural conditions, their behavioural interactions, the dynamics of colony growth and

sexual production, and overall colony fitness. Lab experiments will include the manipulation of the genetic background of colonies, common garden and cross fostering setups, as well as reintroductions in field-enclosures. Methods will include ethology, morphometry, and statistical analyses. Avenues of research will be discussed with the PhD student depending on her/his specific topics of interest.

The PhD student will be located at iEES Paris in central Paris, which provides a stimulating environment where she/he will have the opportunity to interact with other PhD students and postdocs as well as researchers on behavioural ecology, functional ecology, evolutionary ecology and theoretical ecology. The PhD project is part of a broader ANR research project on the genetic determination and relative successes of the two alternative strategies of *M. graminicola* ("Social organisation and dispersal: the dual role of a supergene in ants"). The direct research environment will feature another PhD, a postdoc and two geneticists (Claudie Doums, Stefano Mona) studying the structure and evolution of the supergenes and the population genetics of *M. graminicola* and located in a nearby institute (Institute of Systematic, Evolution and Biodiversity) at the MNHN, a theoretical ecologist (Nicolas Loeuille) located at iEES Paris, and an ethologist (Patrizia d'Ettorre) from Université Sorbonne Paris Nord. The PhD student will participate in the monthly ANR meetings.

Applicants should have a Masters degree in ecology, with knowledge and skills in evolutionary ecology, and previous experience (internships or jobs) in experimental ecology. Skills in statistical analyses are also required. A good level in English is expected.

If you wish to apply, please send your CV, motivation letter, and recommendation letters to [mathieu.molet@sorbonne-universite.fr](mailto:mathieu.molet@sorbonne-universite.fr) and [thibaud.monnin@cnr.fr](mailto:thibaud.monnin@cnr.fr). Deadline for applications is April 6th 2024.

## References

- Finand B, Loeuille N, Bocquet C, Fédérici P, Ledamoisel J, Monnin T (2023). Habitat fragmentation through urbanization selects for low dispersal in an ant species. *Oikos*, e10325. <https://doi.org/10.1111/oik.10325>
- Finand B, Loeuille N, Bocquet C, Fédérici P, Monnin T (2024). Solitary foundation or colony fission: an intraspecific study shows that worker presence and number increase colony foundation success in an ant. *Oecologia*, <https://doi.org/10.1007/s00442-023-05509-4>.