Abstract
The ant genus Hypoponera, with its high diversity of alternative reproductive tactics, is of particular interest in studies on sexual selection. In the species Hypoponera opacior, winged and wingless males and queens co-occur and molecular markers are essential to study the reproductive success of these sexual tactics. Primers were developed for five polymorphic microsatellite loci isolated from H. opacior. Their variability was tested on 34 colonies from a population in the United States. Nine to 21 alleles per locus were found with observed heterozygosities between 0.1 and 0.7. A significantly positive $F_{is}$ value suggests inbreeding in this ant with predominant intracolonial matings.

Keywords: Hymenoptera, Hypoponera, microsatellites, Ponerinae

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In most ant species, sexual selection is less intense because nuptial flights do not allow males to monopolize females. The ant genus Hypoponera, however, contains a large diversity of reproductive strategies and tactics both in males and queens (Le Masne 1956; Yamauchi et al. 1996, 2001; Foitzik et al. 2002). In the Neotropical Hypoponera opacior, winged queens and males copulate during nuptial flights in the early summer, while in August wingless males guard females and mate with them within the mother nest. These reproductive strategies are associated with differences in colony organization: dealate queens head mostly monogynous, monodomous colonies, while colonies with wingless sexuals commonly contain several queens and occupy multiple nests. The latter social organization resembles that of unicolonial, invasive ants and indeed some Hypoponera species are cosmopolitical tramps (Holway et al. 1998; Giraud et al. 2002). High resolution molecular markers are necessary to measure the reproductive success of various sexual tactics to shed light on the evolution and maintenance of alternative reproductive strategies. Here, we characterize five polymorphic loci for H. opacior, which will further allow the analysis of the impact of inbreeding and reproductive behaviours on the fine-scale genetic structure of colonies and populations.

Correspondence: M. H. Rüger, Fax: +49 89 218074 221; E-mail: rueger@zi.biolgie.uni-muenchen.de
Unhybridized fragments were removed in four washing steps. Another PCR was performed directly with 1 µL of bead solution under the same conditions but without the initial extension step.

The DNA enriched with repeat motives was ligated into the plasmid pCR 2.1 and transformed into Top 10F' cells (TA Cloning Kit; Invitrogen). Positive clones were dot-blotted onto nylon membranes (Hybond™-N; Amersham Life Science) and probed with fluorescein-11-dUTP labelled oligonucleotides (CA)\(n\) (Gene Images 3′-oligolabelling and Gene Images CDP-Star detection module; Amersham Life Science).

We detected 96 complementary Plasmid inserts, 82 of which were sequenced using BigDye Terminator v1.1 Cycle Sequencing Kit (Applied Biosystems) and M13 forward and reverse primers (MWG) on an ABI Prism 310 Genetic Analyser (Applied Biosystems). Primer pairs were designed by hand for 13 of the 55 clones, which possessed repeat motives and these were tested on DNA from individuals of eight different colonies, which was extracted from single cells (TA primer pairs) and from whole colonies of the ant Hypoponera opacior. Gradient PCR was thus proven to be an important step forward in the analysis of the evolutionary basis of the fascinating reproductive strategies in Hypoponera ants.

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References


