

Neighbouring-group composition and within-group relatedness drive extra-group paternity rate in the European badger (*Meles meles*)

ABSTRACT

Extra-group paternity (EGP) occurs commonly among group-living mammals and plays an important role in mating systems and the dynamics of sexual selection; however, socio-ecological and genetic correlates of EGP have been underexplored. We use 23 years of demographic and genetic data from a high-density European badger (*Meles meles*) population, to investigate the relationship between the rate of EGP in litters and mate availability, mate incompatibility and mate quality (heterozygosity). Relatedness between within-group assigned mothers and candidate fathers had a negative quadratic effect on EGP, whereas the number of neighbouring-group candidate fathers had a linear positive effect. We detected no effect of mean or maximum heterozygosity of within-group candidate fathers on EGP. Consequently, EGP was associated primarily with mate availability, subject to within-group genetic effects, potentially to mitigate mate incompatibility and inbreeding. In badgers, cryptic female choice, facilitated by superfecundation, superfoetation and delayed implantation, prevents males from monopolizing within-group females. This resonates with a meta-analysis in group-living mammals, which proposed that higher rates of EGP occur when within-group males cannot monopolize within-group females. In contrast to the positive meta-analytic association, however, we found that EGP associated negatively with the number of within-group assigned mothers and the number of within-group candidate fathers; potentially a strategy to counter within-group males committing infanticide. The relationship between the rate of EGP and socio-ecological or genetic factors can therefore be intricate, and the potential for cryptic female choice must be accounted for in comparative studies.

Keyword: Breeding density; European badger; Extra-pair paternity; Group composition; Heterozygosity; Inbreeding; Mate incompatibility; Mating system; Promiscuity