

Kin selected siblicide and filial cannibalism in the European earwig

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Introduction

In species with parental investment, sibling rivalry can severely increase. Siblicide and cannibalism are then beneficial for the survivor by reducing competition level and providing additional food^{1,2}. However, killing a related individual may reduce the survivors indirect fitness³. The ability of kin recognition should therefore play an important role in the evolution of siblicide and cannibalism⁴.

Predictions

1) victims of siblicidal acts live shorter than expected by chance, 2) individuals committing siblicide and cannibalising the victim live longer than expected by chance and 3) relatedness influences the likelihood of siblicide and cannibalism.

Experiment

First instar nymphs of the European earwig (*F. auricularia*) were set-up singly and in pairs of related and unrelated individuals. Survival times were recorded. Expected 'by chance survival times' without siblicide and cannibalism were simulated for victims and survivors in pairs, based on the data from the single individuals.

Results

As predicted if kin selection shaped the evolution of siblicide and cannibalism, the proportion of cannibalised victims in related pairs was lower than in unrelated pairs (Fig.1).

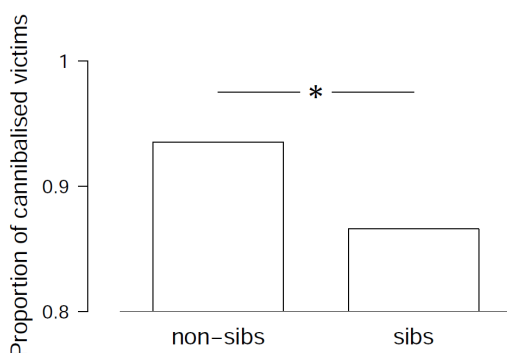


Fig.1: 93.5% of the victims in the non-sib pairs were cannibalised, 86.7% in the sib pairs. Although both values were high, the difference between the two groups was significant: Fisher's exact test $p=0.013$.

Further, as predicted, victims died earlier than expected and survivors lived longer than expected (Fig.2).

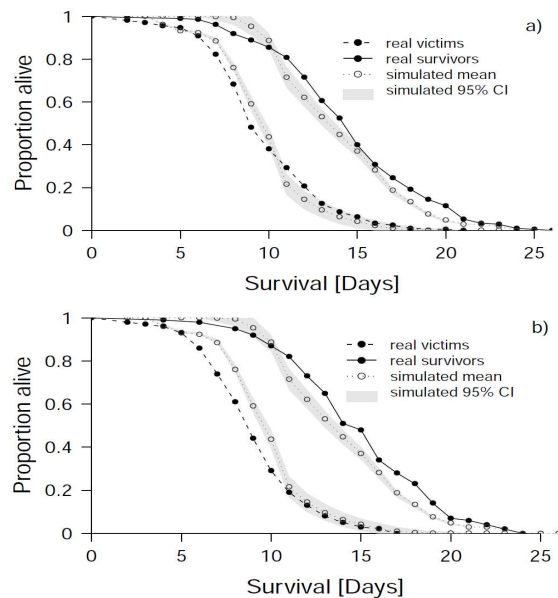


Fig.2: Overlay of simulated and observed survival data. a) observed survival data from related pairs. b) observed survival data from unrelated pairs. Relatedness had a significant effect on the survival of the victims but not of the survivors (parametric survival fit (Weibull distribution): victims $LL-\chi^2=4.863$, $p=0.023$, related victims lived longer; survivors $LL-\chi^2=0.040$, $p=0.840$). Simulated data based on 1000 runs.

Conclusion

First instar nymphs of the European earwig commit siblicide actively. Siblicide implies negative fitness consequences for the victims and positive fitness consequences for the survivors. Kin recognition plays an important role in the evolution of siblicide and cannibalism in this species.

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