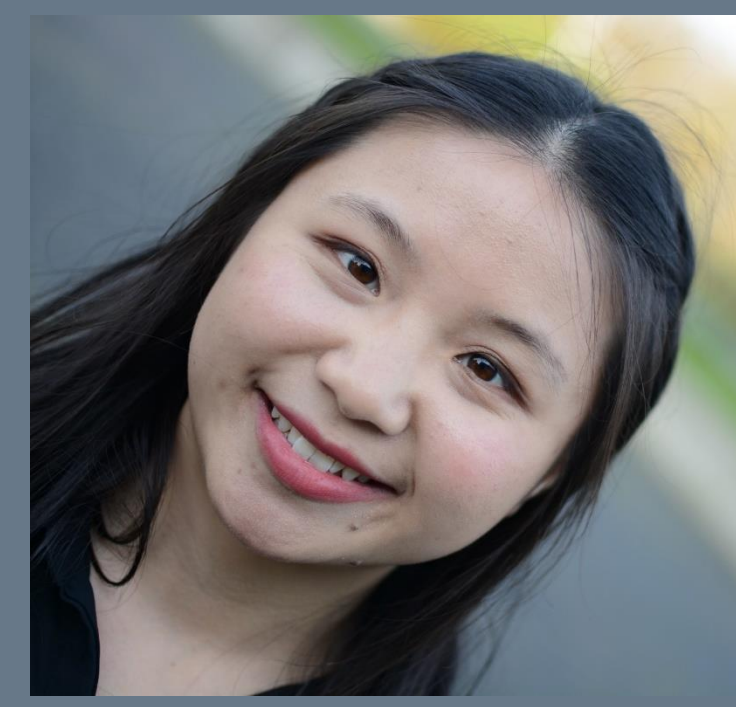


# Coevolution of sex-specific parental roles and the sex ratio

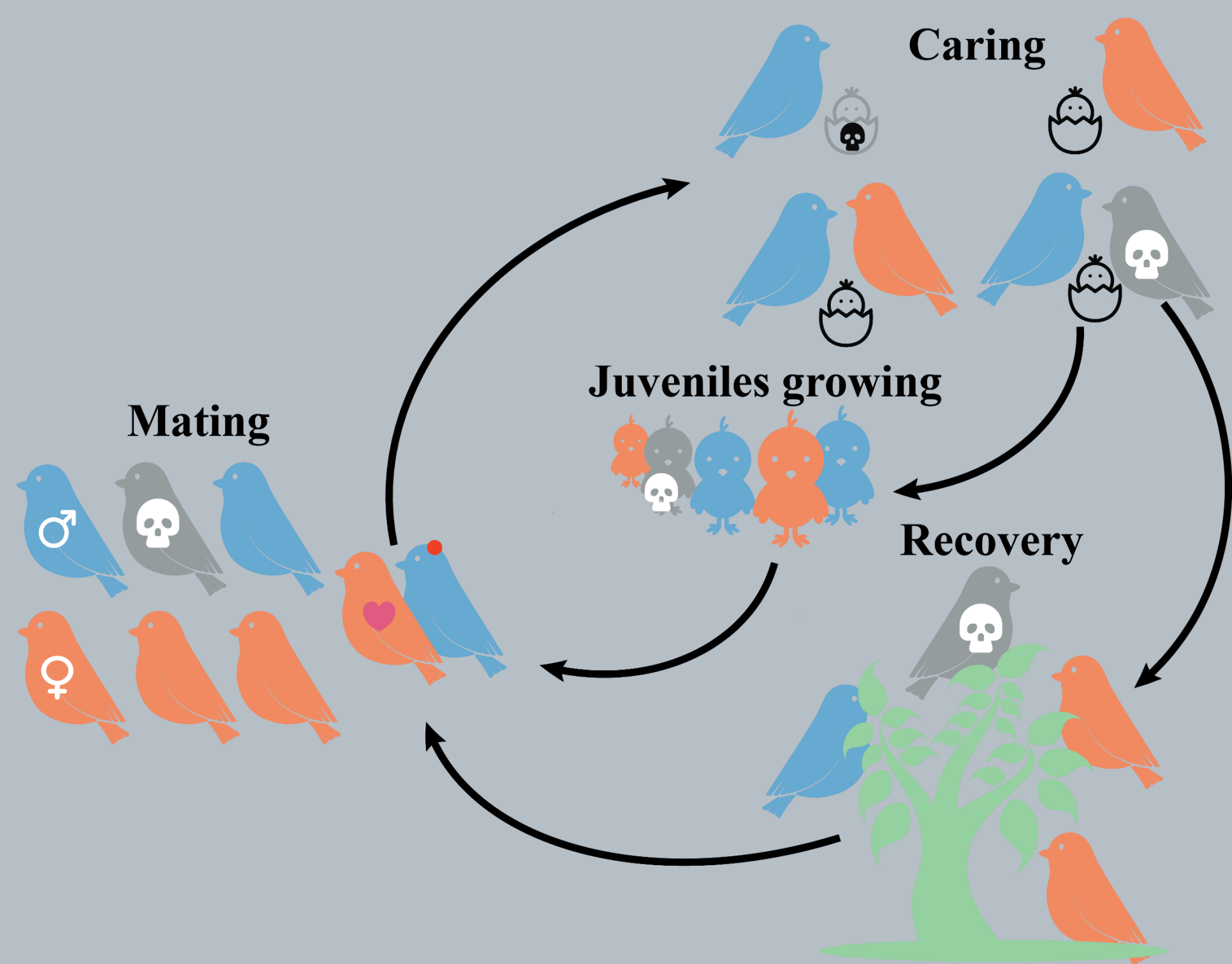
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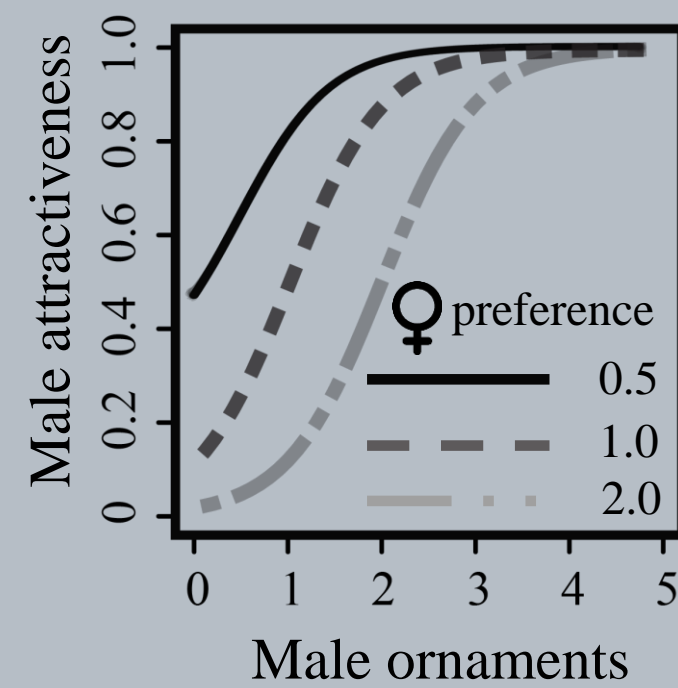


## MODEL DESCRIPTION



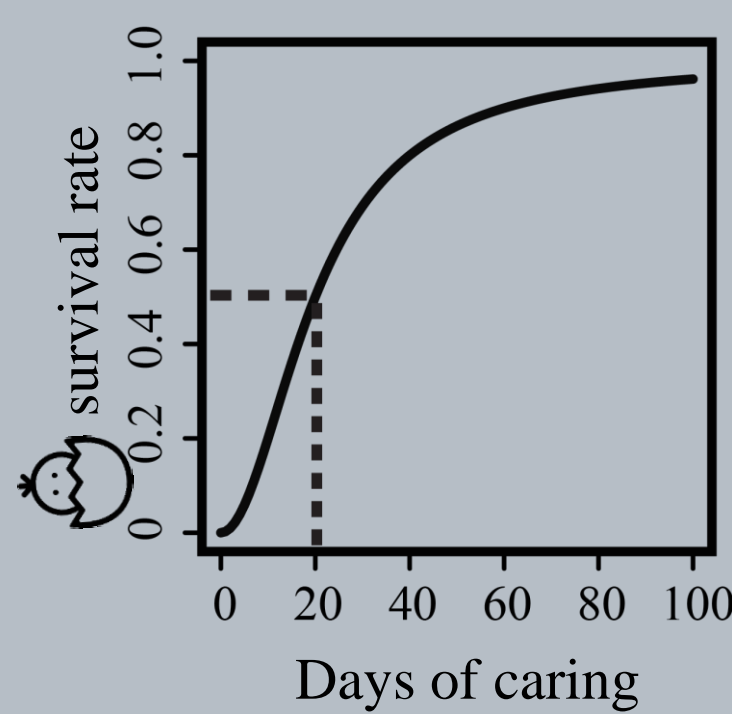
### Mating phase

Females evaluate males based on their ornaments. Male ornaments and female preferences are both heritable and, hence, evolvable properties. We assume that, due to ornamentation, **mating is riskier for males** than for females.



### Caring phase

Successfully mated individuals enter the caring stage. The time devoted to caring is a sex-specific heritable strategy and, hence, a heritable property. The survival of the nestlings is positively related to the total amount of care received.



### Recovery phase

After the end of the caring phase, individuals enter a sex-specific recovery phase. The duration of this phase is a fixed parameter. After recovery, an individual enters the mating phase again.

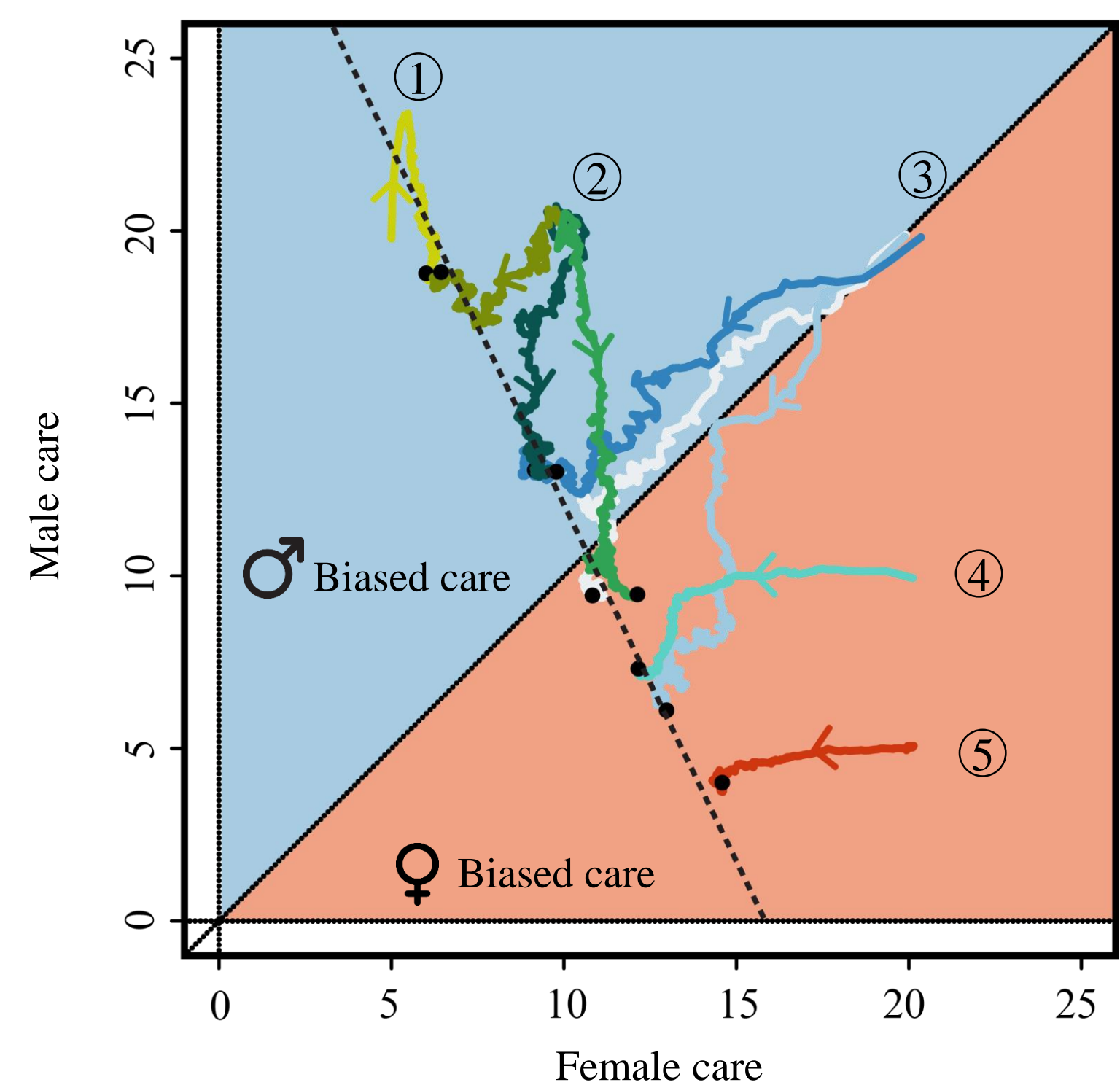
### Juvenile phase

After fledging, the juveniles enter the juvenile phase, where they have a fixed, sex-specific maturation rate. After maturation, the juveniles enter the mating phase.

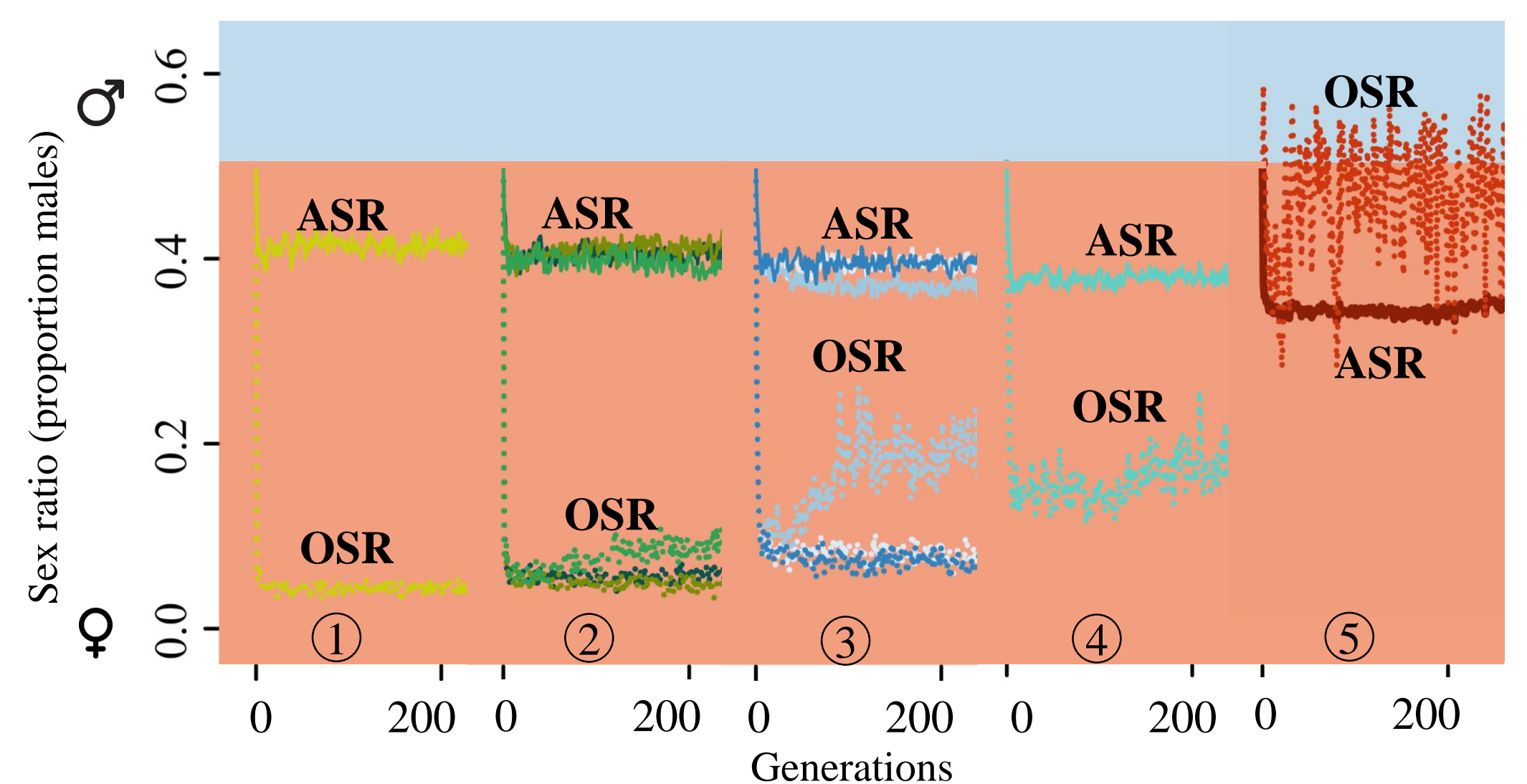
## INTRODUCTION

There is much debate in the literatures about whether and how the adult sex ratio (ASR) and the operational sex ratio (OSR) determine the evolution of parental roles. Actually, sex ratio and parental roles coevolve due to feedback loops. We investigate these feedbacks by means of individual-based evolutionary simulations.

## SIMULATION RESULTS



**Fig1.** Evolution of sex-biased care pattern for five initial conditions. The system converges to a line of equilibria, which differ strongly with respect to parental roles.



**Fig2.** For the simulations in Fig. 1, both sex ratios (ASR and OSR) co-evolve with sex-specific parental care. ASR is positively associated with paternal care, while OSR is negatively associated with male care.

## CONCLUSION

1. Rather than being drivers of parental care bias, ASR and OSR co-evolve with the care bias.
2. Parental care bias can affect ASR and OSR in opposite ways.