Polyandry promotes successful colonisation in novel thermal environments

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Abstract

Global climates are getting warmer, with dramatic consequences for population dynamics and species distributions. We have limited understanding of the colonisaton dynamics when species shift to novel thermal environments, and of the evolutionary processes that promote colonisation and extinction. Previous theory and experimental research has showed that polyandry can promote successful colonisation through reducing levels of inbreeding in newly colonised populations. Here we show that polyandry provides substantial benefits in the colonisation of novel, and harsh, thermal environments. Using colonisation experiments with the model beele *Tribolium castaneum*, we founded populations at increased temperature using either singly or doubly mated females, and followed population dynamics for ten generations. We found that extinction rates were XX in polyandrous compared to XX in monandrous-founded populations.

Key words: colonisation, extinction, population dynamics, sexual selection, Tribolium

Introduction

Materials and Methods

Experimental protocols

All beetles were of our Karakow Superstrain (KSS) and were maintained for X both before and throughout the experiment on a fodder medium consisting of 90% organic white flour, 10% brewer's yeast topped with a thin layer of oats for traction.

Founding females and their mates were reared and mated under standard conditions of 30°C and 60% humidity. Matings were carried out in 5 cm Petri dishes containing Xml fodder. Populations were maintained in 100 ml PVC screw-cap containers, with the caps pierced for ventilation, and containing 70 ml fodder.

All females received two matings lasting 24 hours each. In the first round of matings, random pairs of virgin females and virgin males (aged ~7 days post-eclosion) were combined. In the second round of matings, females from the monandrous treatment were re-mated to the same male, who was removed from the dish before being replaced. Females from the polyandrous treatment were mated to a second male, with males being cycled within groups of five females.

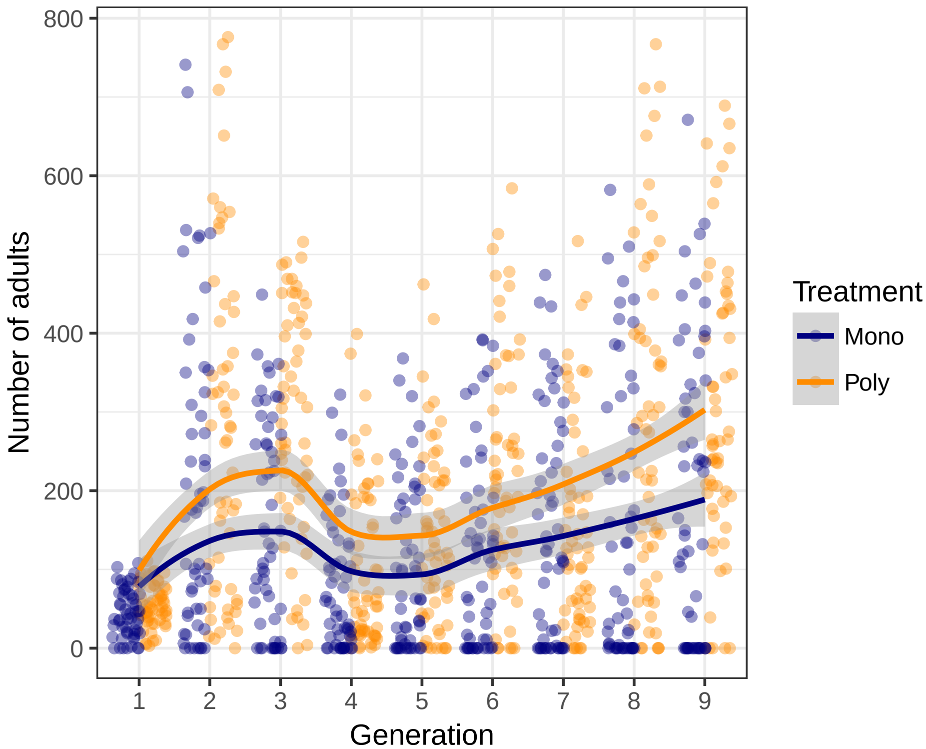
After the second mating round, females were transfered to a population container and left to oviposit for 7 days at 38°C after which she was removed and the offspring left to develop. All containers post-mating were marked only with an ID number so that a population's treatment was unknown by researchers during subsequent handling.

35 days after founding females were removed, generation 1 adults were separated from the fodder by sieving, the fodder was discarded and the container and sieve cleaned with ethanol. The number of live adults was counted and placed into fresh fodder to seed the next generation. If >100 individuals were present, 100 were retained and the remainder discarded after counting.

Another 7 days later, adults were removed by sieving and the offspring again left to develop. This process was repeated for 10 generations.

Statistical analyses

Results



Discussion