Individual reversible plasticity as a genotype-level bet hedging strategy

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Background

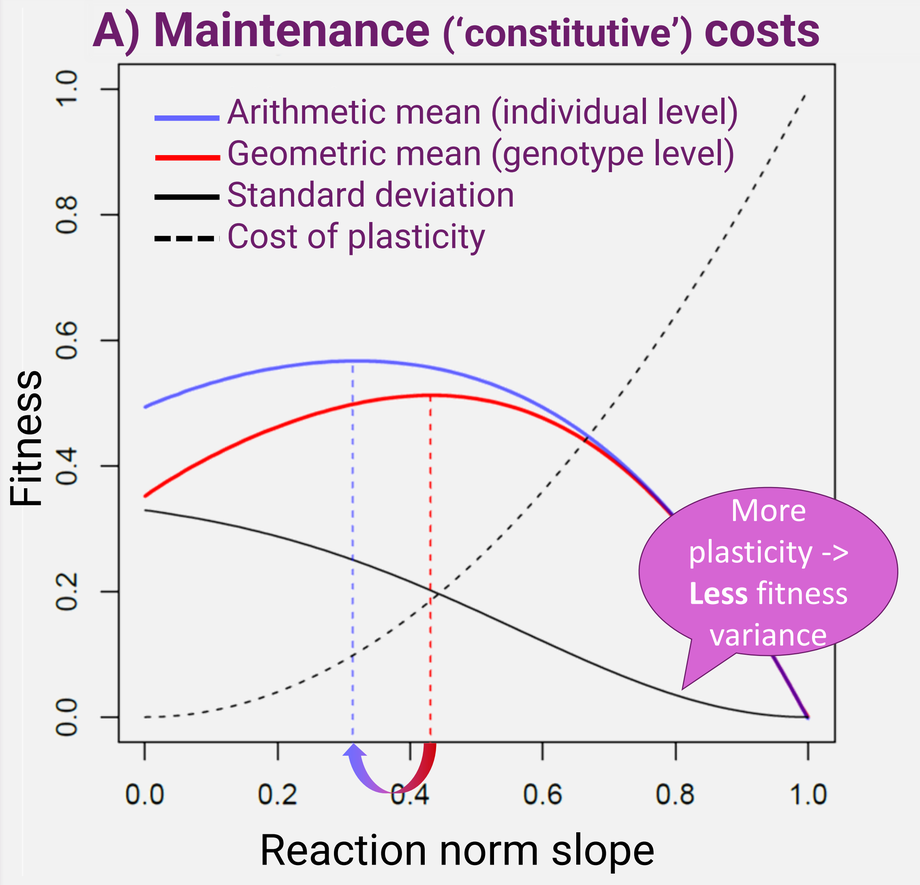
- Reversible phenotypic plasticity affects not only mean fitness, but also fitness variance
- Bet-hedging strategies favour genotypes with low fitness variance, despite lower arithmetic mean fitness
- Perfect plasticity may be costly, but imperfect plasticity creates fitness variance
  → Optimal intermediate levels of plasticity (reaction norm slopes) exist

Bet-hedging is less likely to evolve in fine-grained environments; and if traits are used repeatedly within lifetimes

Question

CAN BET-HEDGING AFFECT OPTIMAL LEVELS OF COSTLY PLASTICITY?

Main findings



Individual-level optimal investment in plasticity is...

Costs

Maintenance: lower

Production: higher

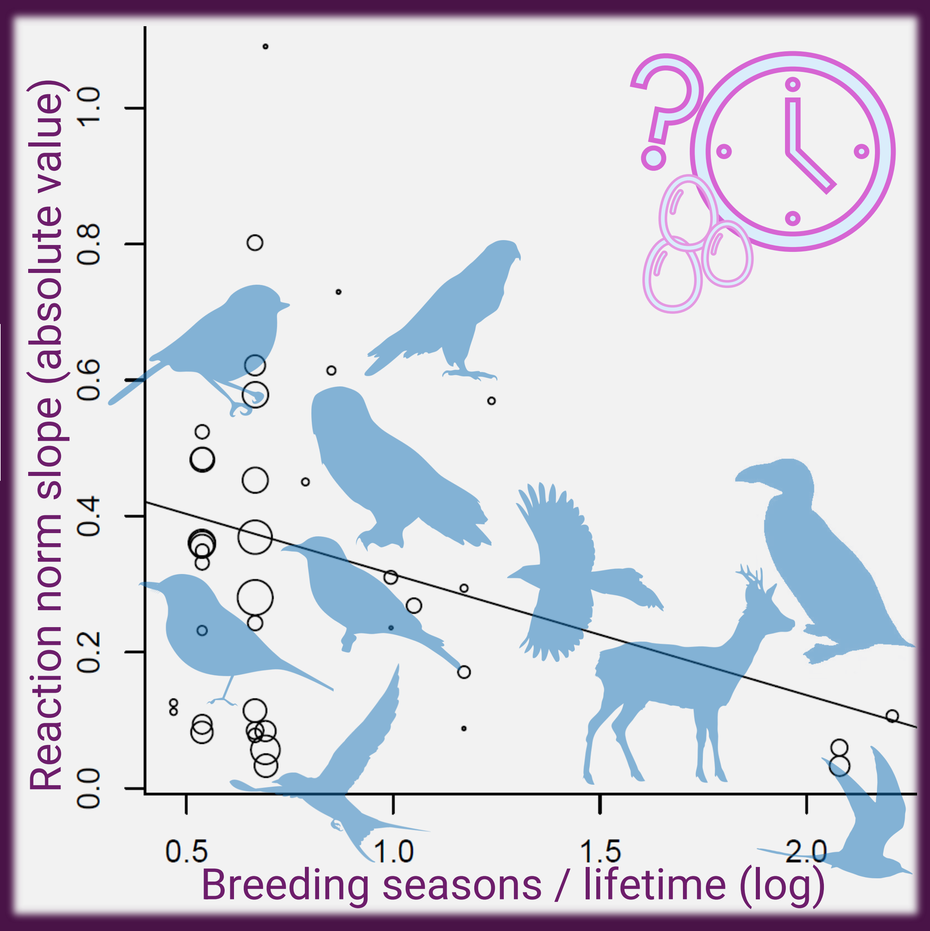
...than genotype-level (bet-hedging) optimum

Application

Plasticity in breeding phenology in response to temperature:

Re-analysis of data from Radchuk et al. 2019 *Nat Comms.*

- Repeated use of trait within lifetimes → Less bet-hedging selection for costly plasticity



Conclusions

- Maintenance costs of plasticity most common in the wild?
- Are phenological changes driven by microevolution or plasticity? Both are more difficult for long-lived species
  → a double threat under climate change

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Check out our *JEB* paper here!