



MATCHED OR MISMATCHED

Transgenerational interaction of mild heat-stress in Japanese quails (*Coturnix japonica*)

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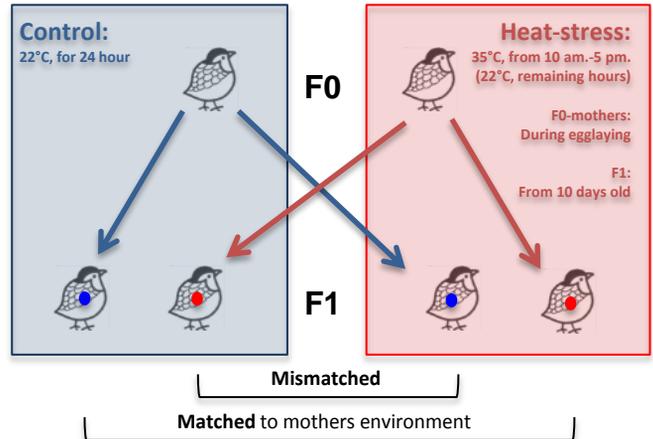
AIM

To test the effects of **maternal heat-stress** (prenatal-stress) and **postnatal heat-stress** and their combined effect on growth, the HPA-axis and metabolism in Japanese quails.

BACKGROUND

- Developmental stress has been shown to affect growth, HPA-axis sensitivity and metabolic energy expenditure.
- Results from mammalian studies suggest that pre- and postnatal stress can have different effects (i.e. hyper or hypo-responsiveness) on the HPA-axis.
- This raises the question of interactive influences between pre- and postnatal stress.

EXPERIMENTAL SETUP



RESULTS

Growth

Fig. 1: Heat-stressed mothers laid smaller eggs

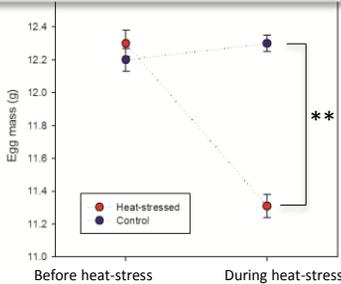
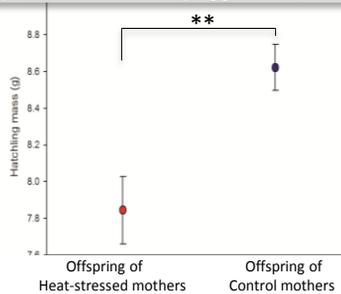


Fig. 2: Heat-stressed mothers produced smaller hatchlings (there was no interaction between maternal heat-stress and postnatal heat stress on offspring growth rate)



HPA-axis

Fig. 3: Corticosterone response 20 min after a single ACTH injection

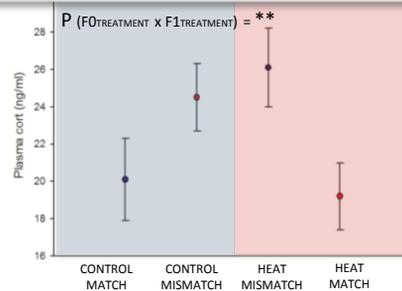
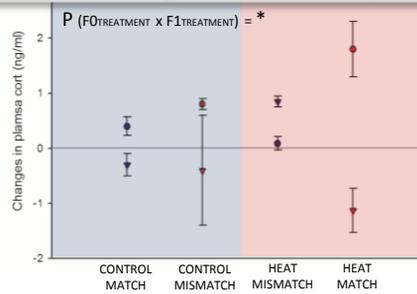
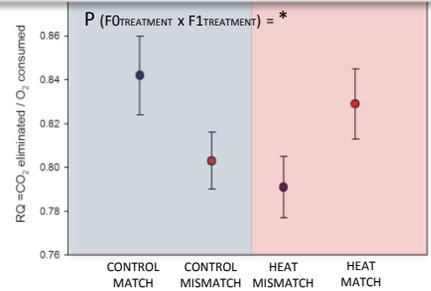


Fig. 4: 15 min heat-shock (40C): Change in corticosterone during heat shock (circle) . Change in corticosterone during 20 min recovery period (triangle)



Metabolism

Fig. 5: Respiratory quotient (CO₂ eliminated / O₂ consumed) (there was no significant effect of heat-stress on metabolic rate)



RESULTS:

Heat-stressed mothers laid smaller eggs (fig. 1) and hatched smaller offspring (fig. 2)

Offspring matched to their mother's treatment had lower but similar corticosterone response to a single ACTH-injection (fig. 3) and higher but similar respiratory quotient (fig. 5) compared to offspring mismatched to their mother's environment

Effect of maternal treatment on the offspring's corticosterone response to short acute heat shock (40 °C) was only evident in offspring raised in a heat-stress environment (fig. 4).

CONCLUSION

We show for the first time that certain effects of maternal-stress during egg formation in an avian species can be eliminated by postnatal-stress in the offspring own environment, and that certain effects of maternal stress are only expressed if offspring experience the same environment postnatally. The fact that postnatal stress can cancel out effects of maternal stress on certain traits indicate that effects of maternal stress might be part of adaptive programming.



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