

Incubation moisture and temperature influence embryo physiology in the Eastern Fence Lizard (*Sceloporus undulatus*)

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Introduction

Moisture and temperature influence embryo development of oviparous vertebrates. Although much research demonstrates their independent effects, little is known about how future changes in both moisture (i.e. precipitation) and temperature due to climate change will interactively influence egg survival and embryo development (Hall & Sun 2021).

Methods

- We incubated eggs of the Eastern Fence Lizard (*Sceloporus undulatus*; Figure 1) at two moisture substrate levels (-550 kPa and -150 kPa water potential) and at two different temperature conditions, one simulating a normal fluctuation in temperature, and one simulating heat stress.
- We measured water absorption and developmental rates of eggs and resultant body size of hatchlings.

Hall JM, Sun B. 2021. Heat tolerance of reptile embryos: current knowledge, future directions, and methodological considerations. *Journal of Experimental Zoology*. 335(1), 45-58.

Results

Mixed effects linear models revealed that eggs in the dry treatment absorbed less water but had faster developmental rates than those in the moist treatment. Hatchlings in the hot treatment also developed at a faster rate than those in the cool treatment. Egg survival was greater in the moist than dry treatment. However, treatments had no effect on hatchling body size (Figure 1).

Conclusion

Though the four treatments caused differences in water absorption and developmental rate, this had no effect on hatchling body size. This means our treatments influence the water available to developing embryos in ways that influence developmental physiology, but the additional moisture is not incorporated into the body tissues. The effects on physiology may have influenced embryo survival, as survival was highest in cool, moist conditions and lowest in hot, dry conditions.

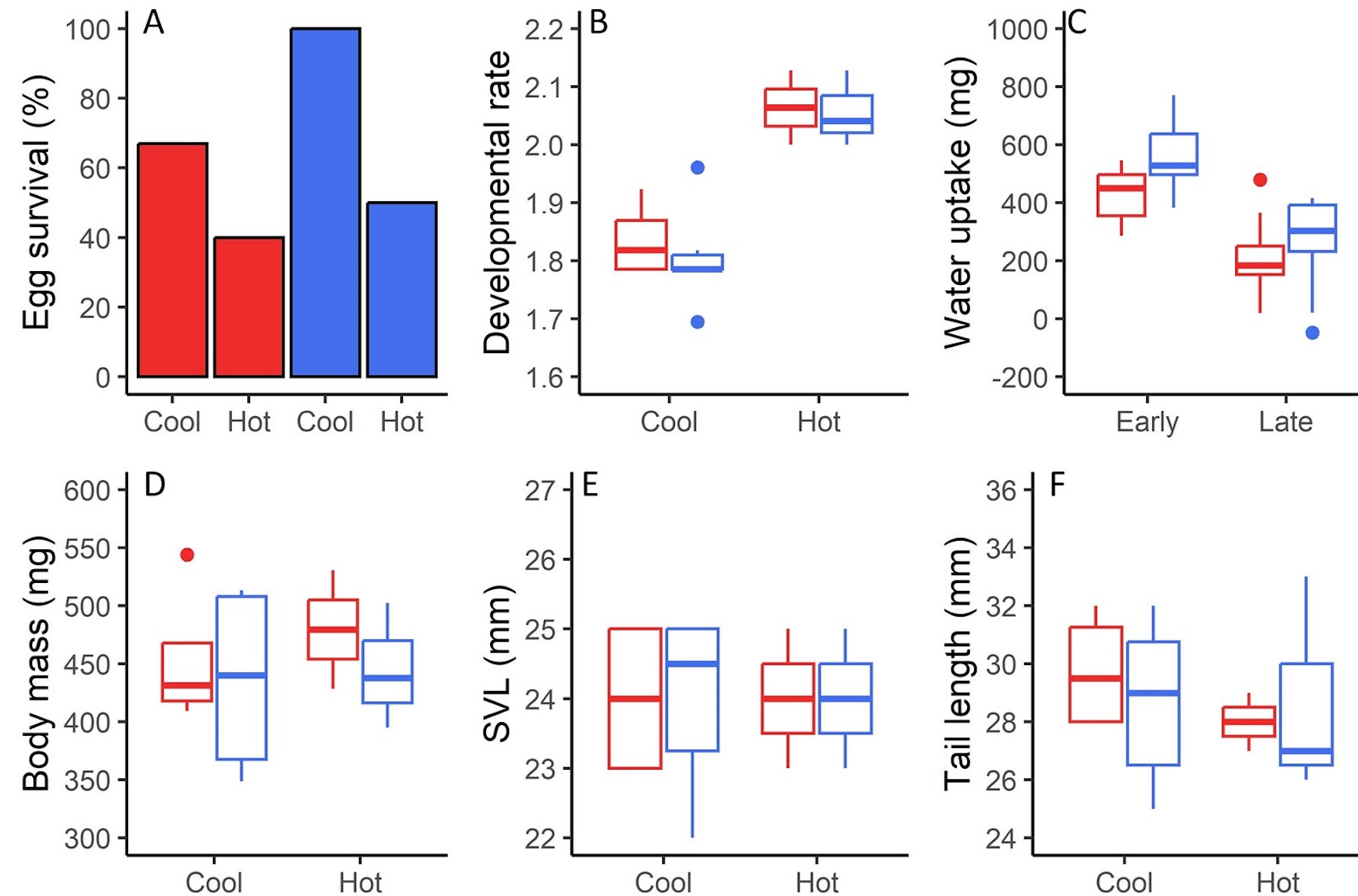


Figure 2. Eggs gained more water early vs late in development ($p < 0.0001$) and when in moist substrate compared to dry substrate ($p < 0.0001$). Other observations showed no significant differences between treatments.

Figure 1. Adult male eastern fence lizard (right) and hatchling (below).



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