Incubation moisture influences 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 lizard (*Sceloporus undulatus;* Figure 1) at two moisture substrate levels (-550 kPa and -150 kPa water potential).
- All eggs were incubated at 28.5 ° C, a standard temperature for incubating eggs of this species.
- We measured water absorption and developmental rates of eggs and resultant body size of hatchlings.

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. However, this had no effect on hatchling body size (Figures 2-4).

Conclusion

Though the two 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.

Future Directions

We are currently conducting a study on the interaction of heat stress and these moisture treatments. The present results demonstrate that any moisture by temperature effects we observe will be due to physiology rather than moisture-induced changes in body size (i.e. thermal inertia).

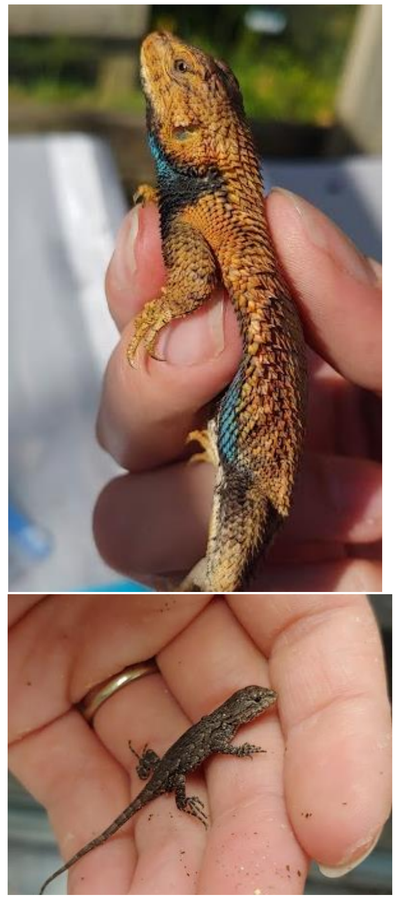

Figure 1. Adult male eastern fence lizard (above) and hatchling (below).

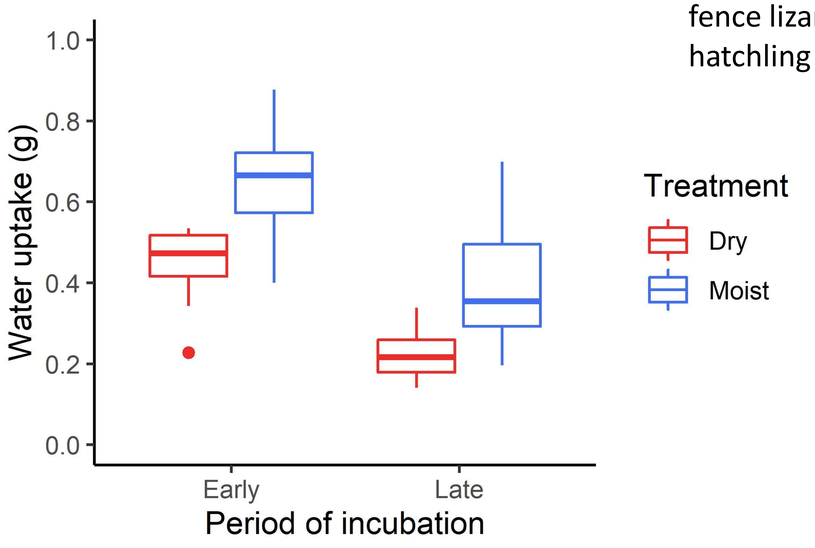

Figure 2. Eggs gained more water early vs late in development ($p < 0.0001$) and when in moist substrate compared to dry substrate ($p < 0.0001$).

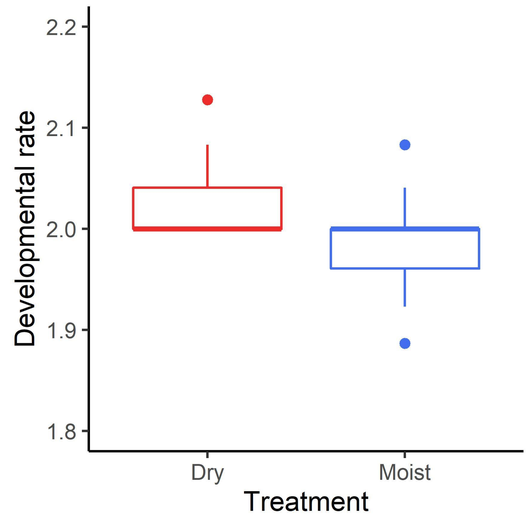

Figure 3. Embryos in dry soil developed faster than those in moist soil ($p = 0.03$)

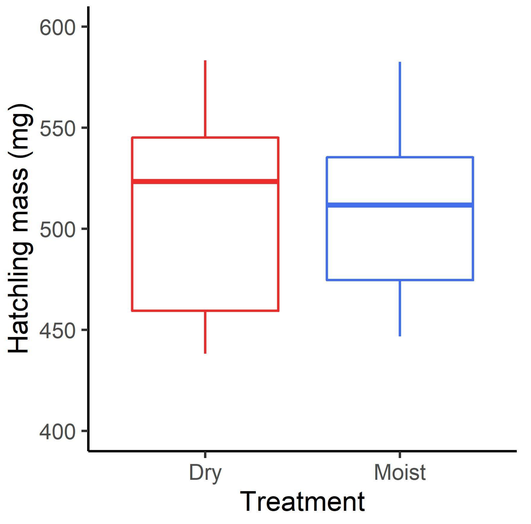

Figure 4. The moisture treatments did not affect hatchling body size ($p = 0.83$)

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