Results

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# Results

*(a)Incubation temperature and resource allocation consequences on thermal preference and critical thermal maximum*

Hatchling *Lampropholis delicata* mean thermal preference (T) was 31C and ranged from 20.99–34.26C. Mean critical thermal maximum (CT) was 43.04C and ranged from 38.6–45.2C. We did not detect any effect of incubation temperature, yolk treatment, sex, or body mass on T or CT (Figure 1A|B; Table 1). The WAIC model comparisons further support these findings, where our null model ranked as the most parsimonious over other model combinations for both T or CT (Table S1)

*(b) Meta-analysis of early thermal effects on thermal physiology in reptiles*

Across reptiles, developmental temperatures did not influence thermal traits (T or CT), but heterogeneity was high (ARR =0.05-, 95% CI:-0.28-0.37 ; = 99.53%, Prediction Interval:-1.23-1.32; Fig. 2A, n = 69 effects from 13 species).Thermal traits were not influenced by life stage or climatic zone (Fig. 2B|C). When analysing each reptilian taxonomic group separately, there was no variation in thermal traits for lizards, tortoises, tuataras, and turtles. However, there was a significant increase in thermal traits in snakes (Fig 2D). Species effects ( = 99.53%)) drive most of the heterogeneity, with two species Chelydra serpentina and Nerodia sipedon exhibiting significant thermal physiological responses to incubation temperatures (Fig. S2). Under higher developmental temperatures, thermal traits in *Chelydra serpentina* decline by 7% while thermal traits in *Nerodia sipedon* increase by 20%. We found no evidence for publication biases (=-0.81, 95%CI=-1.92-0.3, *p=0.15*; Fig S3; *for details see electronic supplementary materials*).

# Tables & Figures

Table 1. Model outputs coefficients for testing wither sex, body mass, incubation temperature, resource, or the interaction between resource and temperature had an effect on T or CT in hatchling *Lampropholis delicata*. Est. value describes the estimated coefficient value and 95% CI describes the lower and upper bound of the 95% credible interval for each coefficient value. Intercept is the estimated mean of each thermal trait from the null model.

| Thermal Index | Covariate | Estimate | l-95% CI | u-95% CI | p value |
| --- | --- | --- | --- | --- | --- |
| *Tpref* | **(Intercept)** | **30.94** | **28.67** | **33.20** | **0.00** |
| Body Mass | 0.44 | -0.97 | 1.86 | 0.53 |
| Sex | 0.30 | -2.50 | 3.09 | 0.83 |
| Incubation Temperature | -0.35 | -2.36 | 1.66 | 0.72 |
| Resource | 0.19 | -1.83 | 2.20 | 0.85 |
| Incubation Temperature\*Resource | -0.22 | -4.31 | 3.87 | 0.91 |
| *CTmax* | **(Intercept)** | **43.27** | **42.17** | **44.37** | **0.00** |
| Body Mass | -0.41 | -1.08 | 0.25 | 0.21 |
| Sex | -0.03 | -1.35 | 1.28 | 0.96 |
| Incubation Temperature | -0.18 | -1.14 | 0.78 | 0.70 |
| Resource | -0.24 | -1.20 | 0.71 | 0.61 |
| Incubation Temperature\*Resource | -0.52 | -2.47 | 1.44 | 0.59 |

![](data:application/pdf;base64,) Figure 1. Thermal indices across different incubation temperatures and resource treatments for hatchling *Lampropholis delicata* (n=10 per temperature and treatment). (A) Thermal preference (T) in lizards incubated at 23 & 28°C for each resource treatment (yolk ablation & control). (B) Critical thermal maximum (CT) in lizards incubated at 23 & 28°C for each resource treatment. Bars above plots indicate pairwise comparisons of thermal indices between treatment temperature and the interaction between treatment temperature and resource treatment.

![](data:application/pdf;base64,) Figure 2. Magnitude of the effect on developmental temperature on thermal indices (T & CT) in reptiles (A) with respect to age class (B), climatic zone (C), and taxon (D). Mean meta-analytic estimates (circles) with their 95% confidence intervals (thicker error bars) and prediction intervals (thinner error bars). Individual data points (colored circles) from each study from meta-analysis are scaled by precision (inverse of standard error) and k is the number of effect sizes with number of species in brackets. ARR is acclimation response ratio. Graphs were constructed using the orchaRd package (Nakagawa et al., 2021; version 2.0).

# Supplementary Tables

![](data:application/pdf;base64,) Figure S1.Methods for collecting Tpref in Lampropholis delicata. Lizards were placed in Falcon tubes in a temperature-controlled bath. To obtain the most accurate Tb for skinks, temperature was monitored with a thermocouple probe secured within Falcon tube and an additional thermal couple that was placed in the bath. Water temperature was increased to 38◦C at a rate of 1◦C/min intervals. Every 1min tubes were rotated to check righting reflex of skinks. CTmax was defined as the temperature at which an individual lost their righting reflex.

![](data:application/pdf;base64,) Figure S2. Figure S2. Decision tree showing the eligibility criteria used to assess full-text articles.

![](data:application/pdf;base64,) Figure S3. PRISMA statement illustrating the systematic literature search and record screening process.

![](data:application/pdf;base64,) Figure S4. Funnel plot of the meta-analytic residuals against precision (1/SE). Each point represents a pair-wise temperature comparison. There is no visually detectable asymmetry.

Table S3. The magnitude of the effect of developmental temperature on ARR on CTmax and Tpref of reptiles. The number of effect sizes is denoted by k and n indicates the number of species. Estimates are species mean meta-analytic estimates with their 95% confidence intervals (lowerCL = lower bound & upperCL = upper bound) and prediction intervals (lowerPR = lower bound & upperPR = upper bound). P values indicate if values are significantly different from zero. The conditional r (0.79) and the marginal r (0.01).

| Thermal metric | k | n | Estimate | upperCL | lowerPR | upperPR | p value |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Ctmax* | 21 | 6 | -0.04 | 0.33 | -1.2 | 1.2 | 0.84 |
| *Tpref* | 61 | 15 | 0.09 | 0.41 | -1.1 | 1.3 | 0.58 |

Table S4. The magnitude of the effect of developmental temperature on ARR when accounting for age class. The number of effect sizes is denoted by k and n indicates the number of species. Estimates are species mean meta-analytic estimates with their 95% confidence intervals (lowerCL = lower bound & upperCL = upper bound) and prediction intervals (lowerPR = lower bound & upperPR = upper bound). P values indicate if values are significantly different from zero. The conditional r (0.80) and the marginal r (0.01).

| Age class | k | n | Estimate | upperCL | lowerPR | upperPR | p value |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Adult* | 10 | 3 | -0.01 | 0.48 | -1.3 | 1.3 | 0.98 |
| *Juvenile* | 28 | 6 | -0.01 | 0.45 | -1.3 | 1.2 | 0.97 |
| *Hatchling* | 23 | 8 | 0.07 | 0.45 | -1.2 | 1.3 | 0.72 |

Table S5. The magnitude of the effect of developmental temperature on ARR when accounting for the species origin. The number of effect sizes is denoted by k and n indicates the number of species. Estimates are species mean meta-analytic estimates with their 95% confidence intervals (lowerCL = lower bound & upperCL = upper bound) and prediction intervals (lowerPR = lower bound & upperPR = upper bound). P values indicate if values are significantly different from zero. The conditional r (0.80) and the marginal r (0.01).

| Geographic zone | k | n | Estimate | upperCL | lowerPR | upperPR | p value |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Temperate* | 55 | 14 | 0.06 | 0.41 | -1.3 | 1.4 | 0.74 |
| *Tropical* | 6 | 1 | -0.04 | 1.22 | -1.9 | 1.8 | 0.94 |

Table S6. The magnitude of the effect of developmental temperature on ARR when accounting for reptile taxa. The number of effect sizes is denoted by k and n indicates the number of species. Estimates are species mean meta-analytic estimates with their 95% confidence intervals (lowerCL = lower bound & upperCL = upper bound) and prediction intervals (lowerPR = lower bound & upperPR = upper bound). P values indicate if values are significantly different from zero. The conditional r (0.80) and the marginal r (0.38).

| Taxa | k | n | Estimate | upperCL | lowerPR | upperPR | p value |
| --- | --- | --- | --- | --- | --- | --- | --- |
| *Lizard* | 41 | 10 | -0.12 | 0.17 | -1.16 | 0.92 | 0.37 |
| *Snake* | 7 | 2 | 0.91 | 1.55 | -0.28 | 2.10 | 0.01 |
| *Tuatara* | 2 | 1 | 0.37 | 2.08 | -1.60 | 2.35 | 0.63 |
| *Turtle* | 11 | 2 | -0.29 | 0.51 | -1.56 | 0.99 | 0.44 |