

# Within and trans-generational phenotypic plasticity of freshwater ectotherm *Pomacea canaliculata* in response to thermal stress

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## Introduction

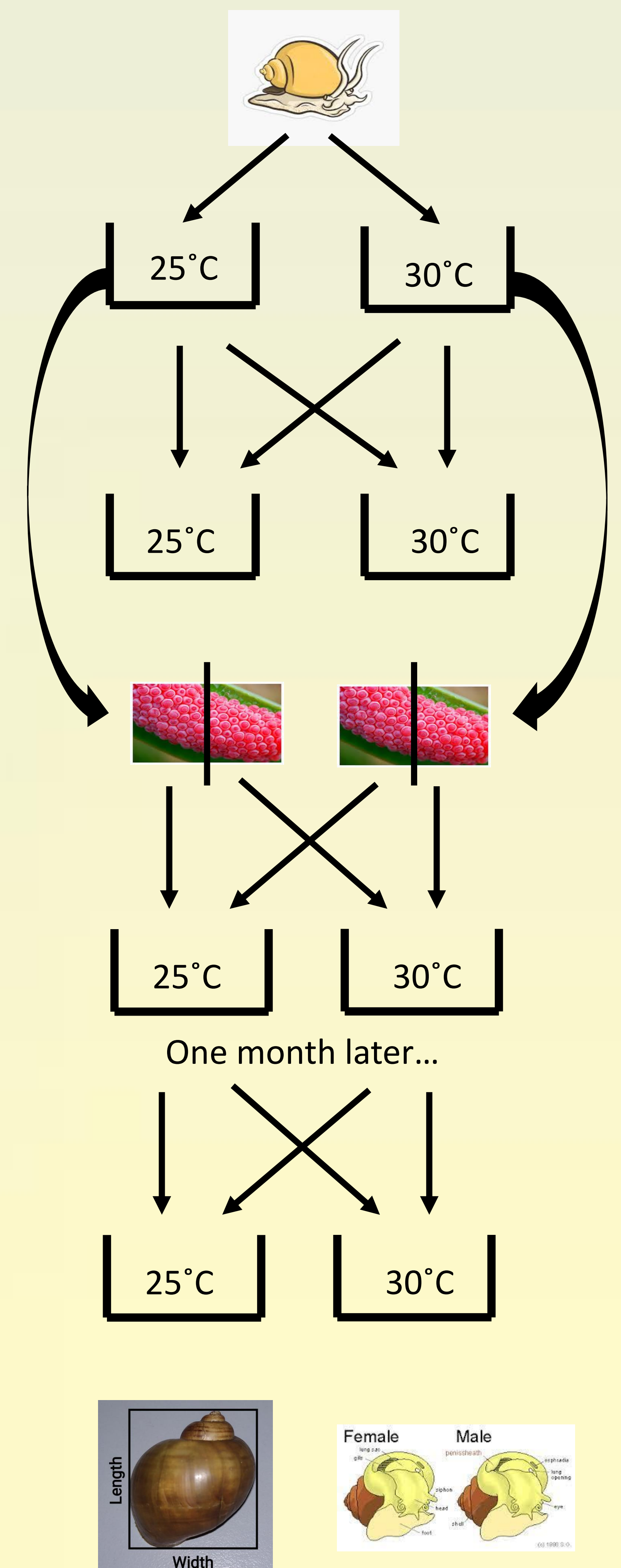
- Biological processes and traits like metabolic rates strongly depend on the size and temperature of the organisms (Metabolic Theory of Ecology)
- The metabolic allometry is described as:
- Metabolic rate  $\propto \text{Mass}^b e^{-E/KT}$
- Under climate change, temperatures are may experience more fluctuations  $\rightarrow$  serious implications to ectotherms, which their body temperature is heavily dependent on the environmental condition
- Phenotypic plasticity help organisms adapt to rapid environmental changes, and this trait allow invasive species to accommodate large ranges of physical factors affecting their growth, survival, and reproduction
- This study will focus on how thermal stress affect an invasive ectotherm species *Pomacea canaliculata*, in two generations to understand the transgenerational effects on development and phenotypic plasticity

## Objectives

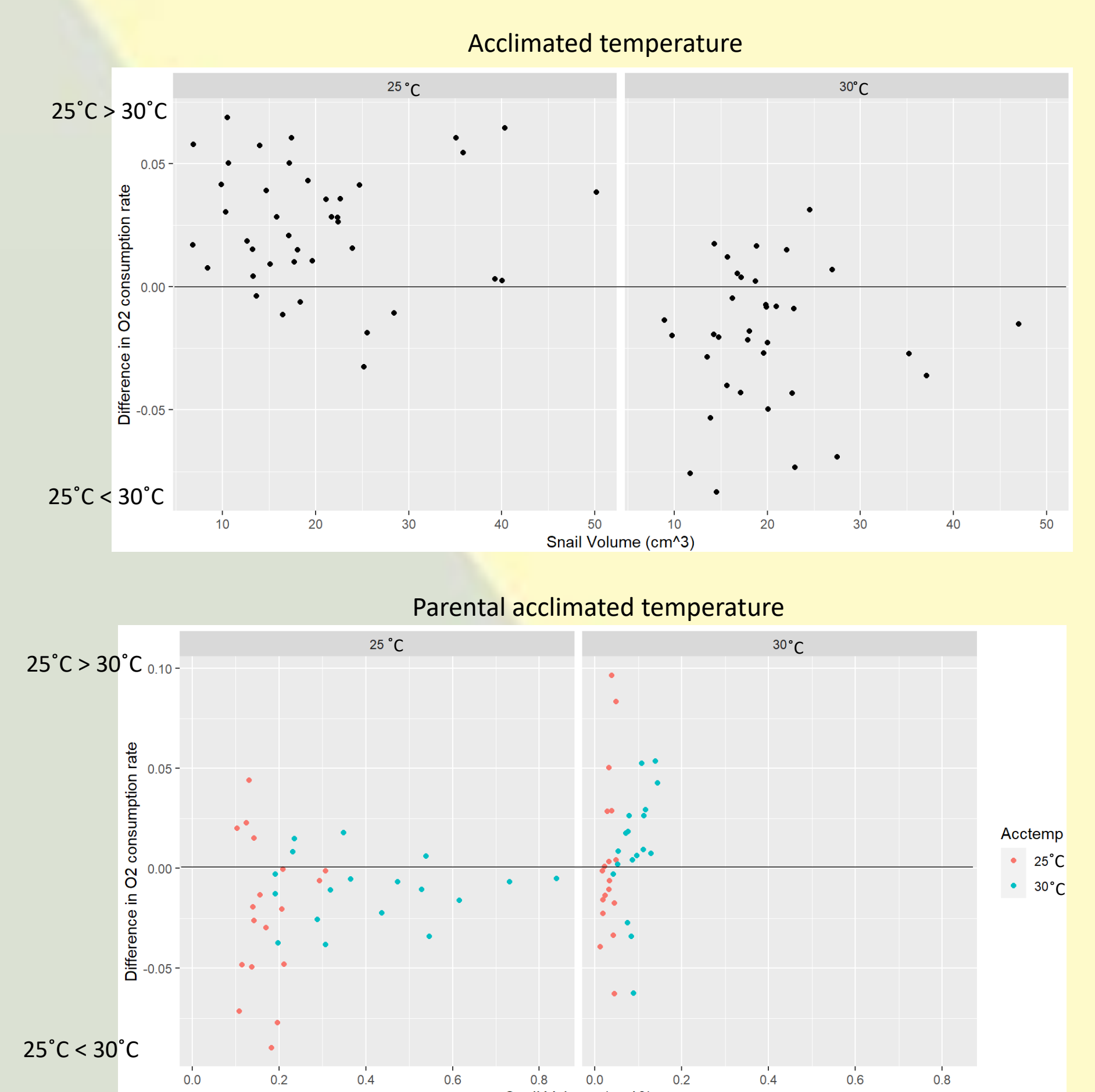
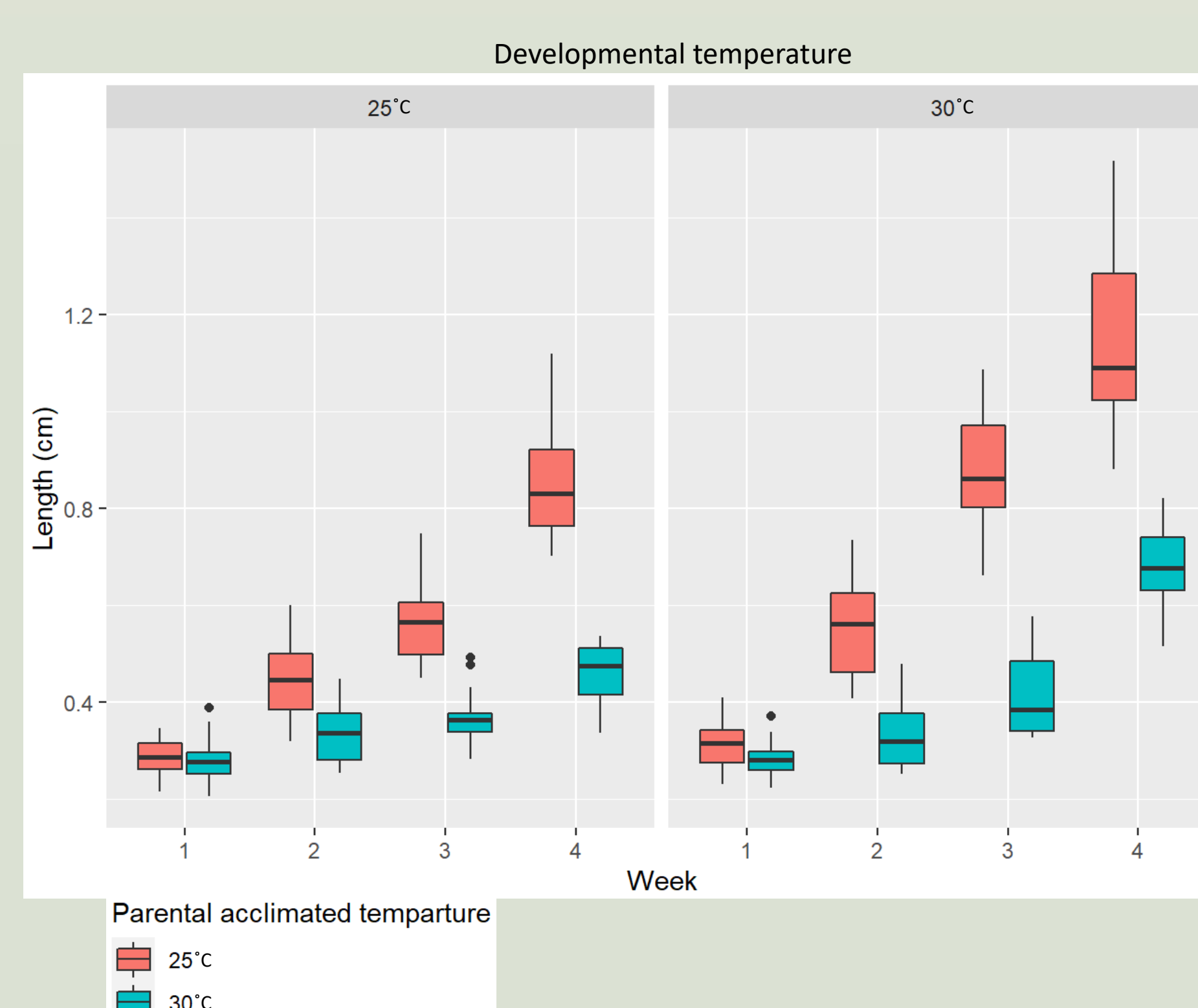
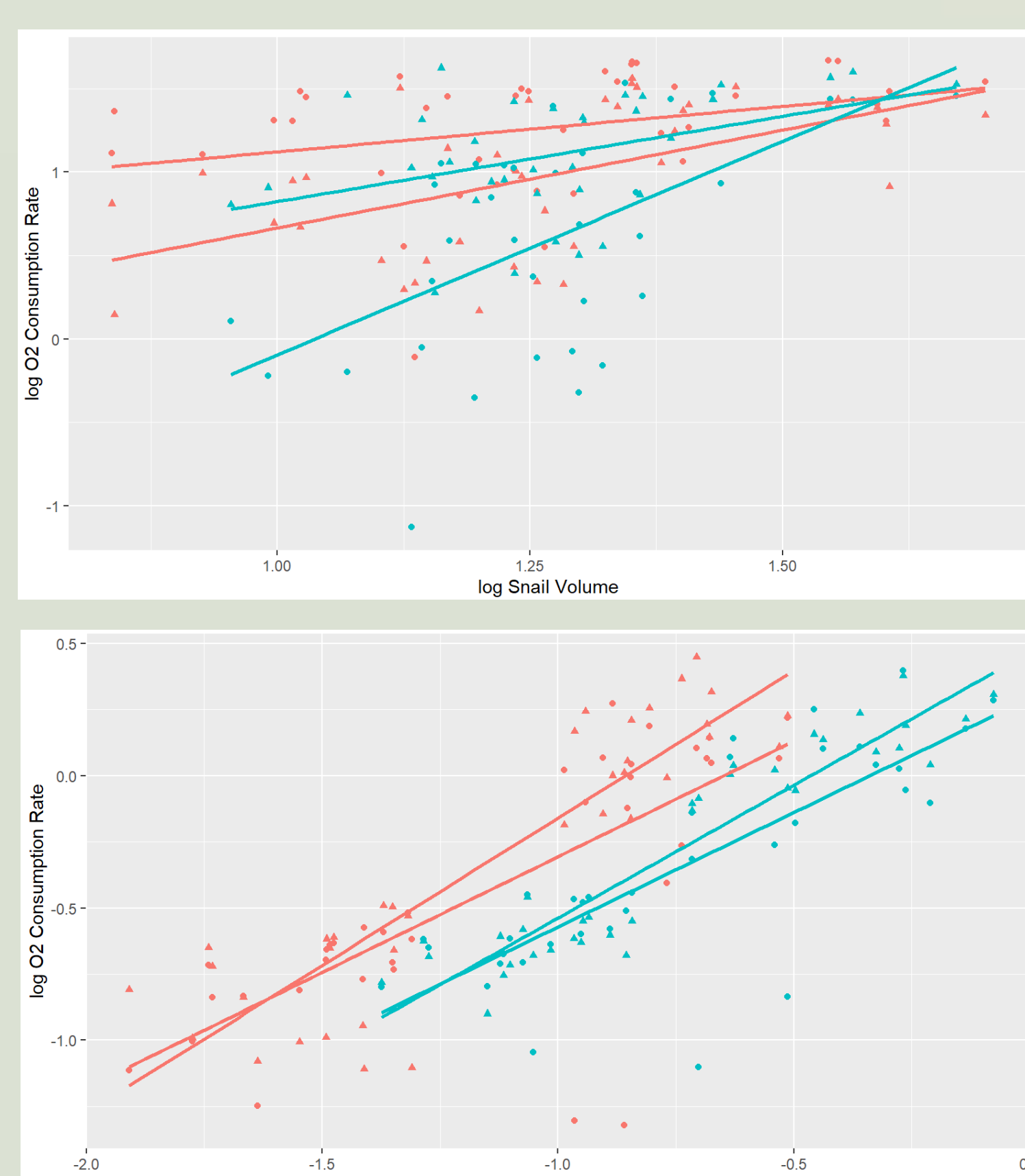
- Determine whether the universal rule of metabolic allometry applies to *Pomacea canaliculata* at different temperature treatment
- Assess the phenotypic plasticity of adult snails in response to thermal stress
- Evaluate whether thermal stress influence the development and phenotypic plasticity of offspring

## Materials and Methods

- Adult snails (F0) collected from Wo Sang Wai, Yuen Long
- Acclimated to water temperature of 25°C (control) and 30°C (heat stress)
- Oxygen consumption of F0 measured at experimental temperature of 25°C and 30°C
- Eggs collected from natural breeding F0 snail
- Half of each clutches hatched in breeding box is acclimated to temperature of 25°C and 30°C
- One month later...
- Oxygen consumption of F1 measured at experimental temperature of 25°C and 30°C at one month after hatching
- Shell length and shell width measured and sex of F0 snails determined



## Results and Discussion



## References

- Brown, J. H., Gillooly, J. F., Allen, A. P., Savage, V. M., & West, G. B. (2004). Toward a metabolic theory of ecology. *Ecology*, 85(7), 1771-1789.
- Gaitán-Espitia, J. D., Bruning, A., Mondaca, F., & Nespolo, R. F. (2013). Intraspecific variation in the metabolic scaling exponent in ectotherms: testing the effect of latitudinal cline, ontogeny and transgenerational change in the land snail *Cornu aspersum*. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*, 165(2), 169-177.
- White, C. R., Marshall, D. J., Alton, L. A., Arnold, P. A., Beaman, J. E., Bywater, C. L., & Ortiz-Barrientos, D. (2019). The origin and maintenance of metabolic allometry in animals. *Nature Ecology & Evolution*, 3(4), 598-603.