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Caterpillar Thermal Tolerance

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Thermal Tolerance of Caterpillars

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INTRODUCTION

- As global temperatures increase, organisms and ecosystems must adapt
 - Ectotherms are most affected
 - Thermal tolerance is the range of temperatures an organism can withstand
→ This can determine climate change response
- Hypotheses**

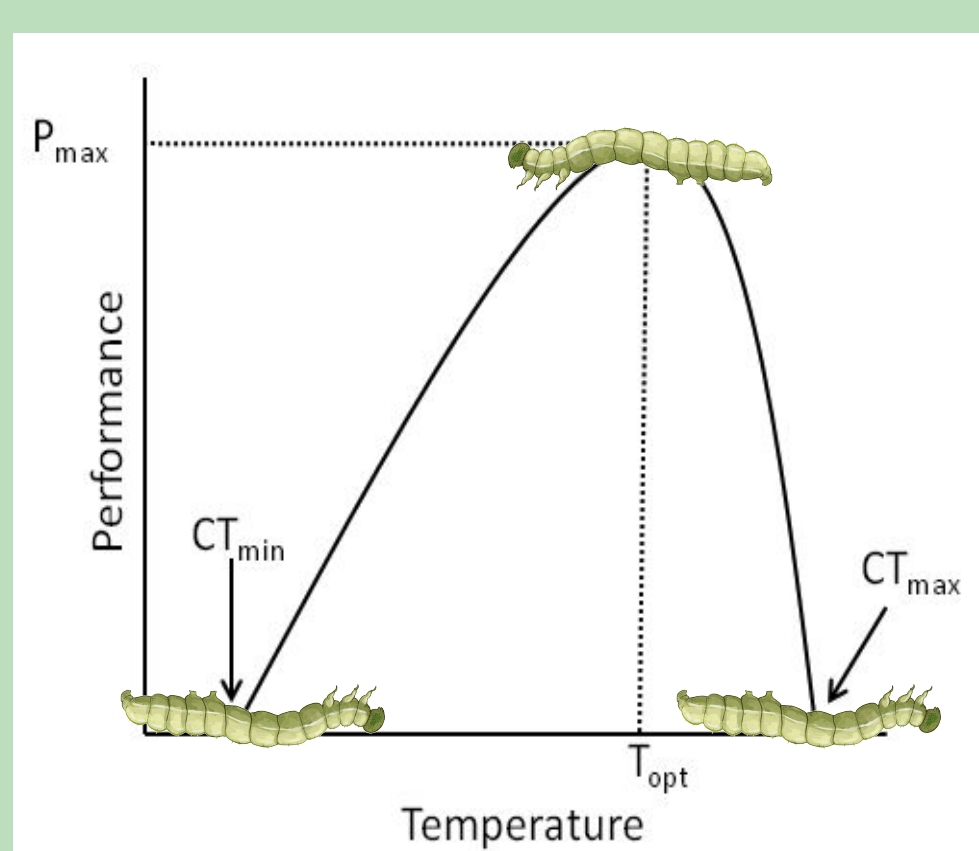
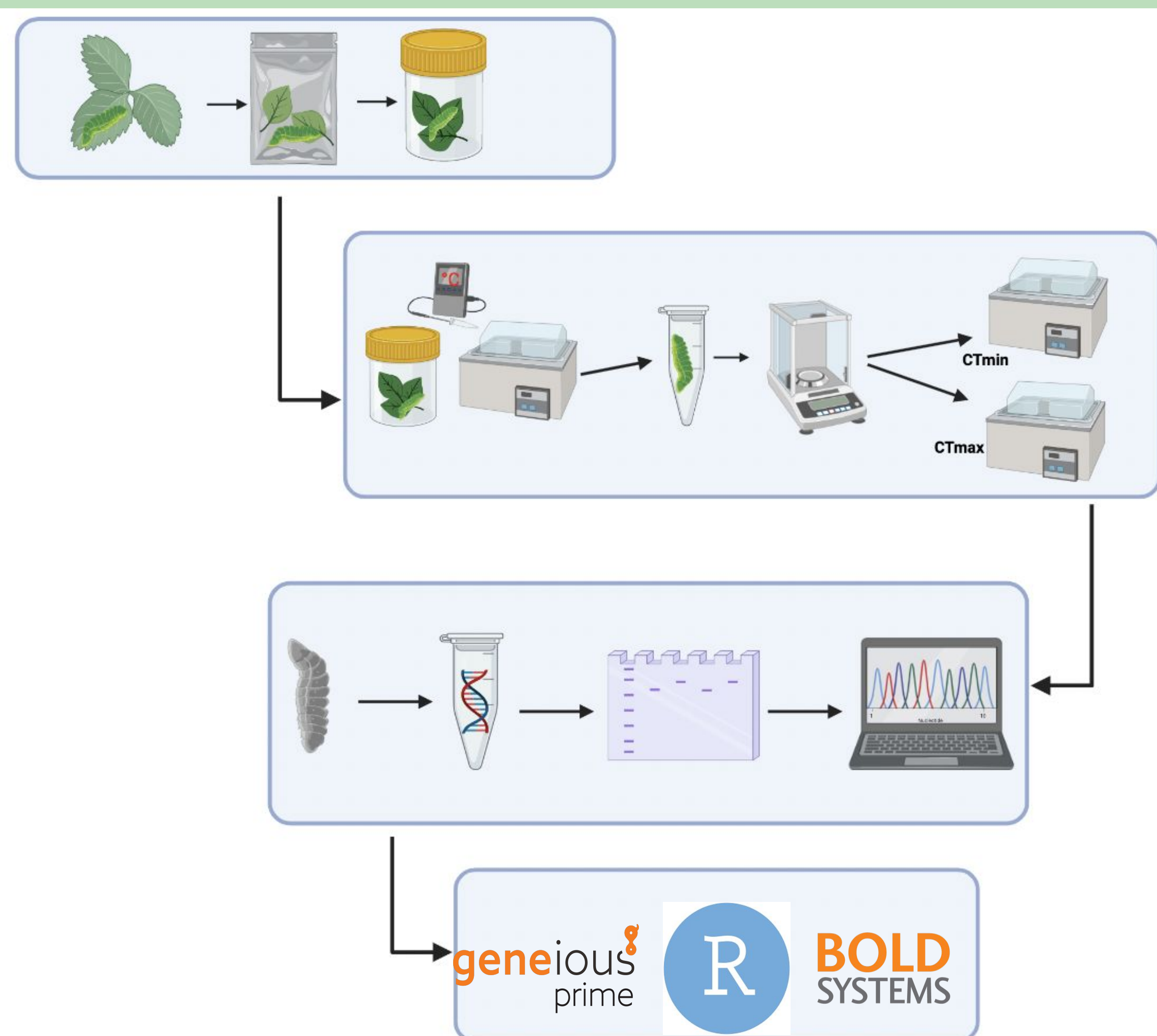


Figure 1. The relationship between the temperature and performance of an organism¹.

- Caterpillars with similar evolutionary histories have similar thermal tolerances¹
→ Due to similar genetics
- Caterpillars with smaller body masses have larger thermal tolerance ranges²
→ Due to similar body heat conservation

METHODS



RESULTS

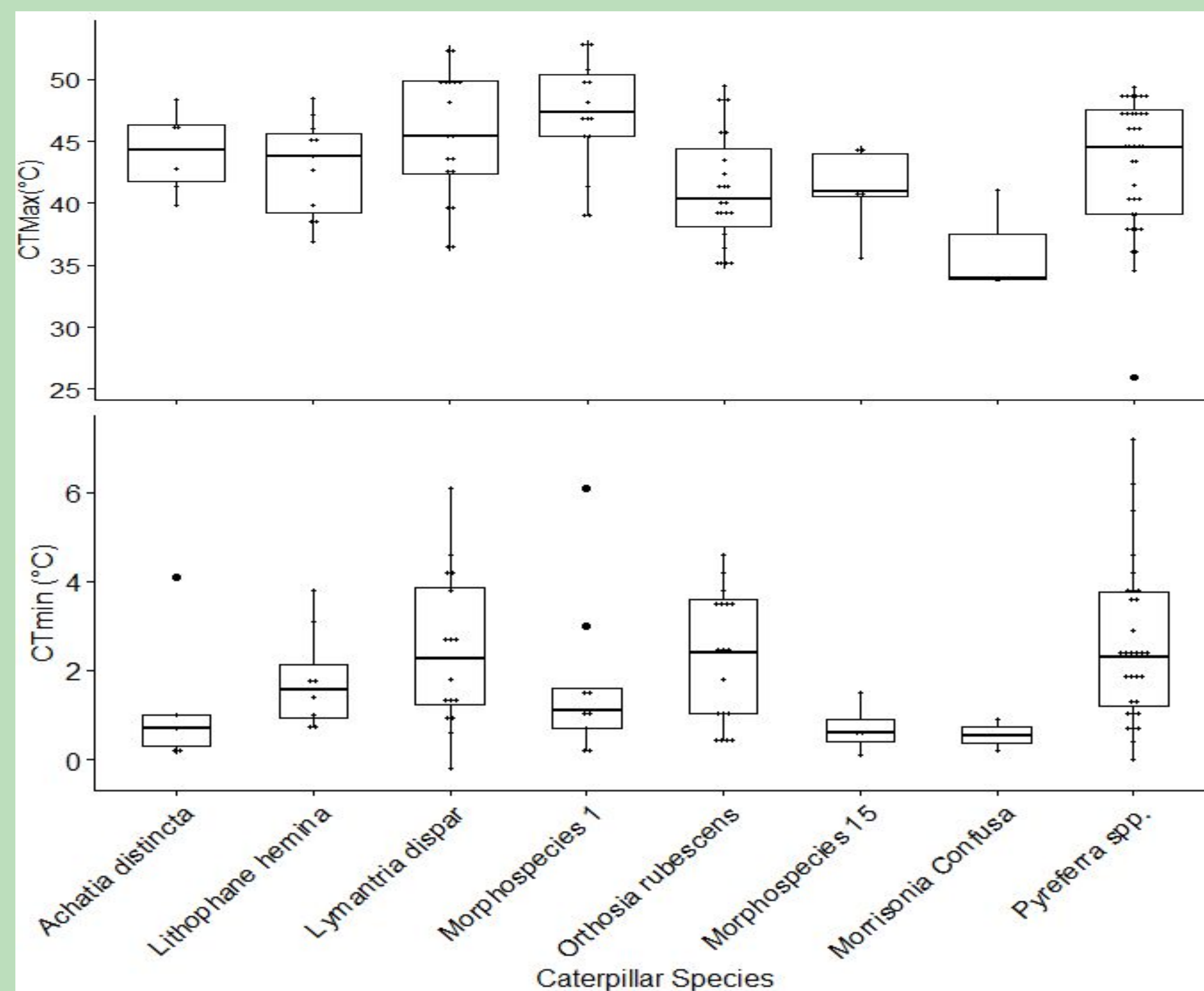


Figure 2. CT_{max} (a) and CT_{min} (b) for common caterpillar species. Measurements were compared to determine if thermal tolerance differed among species. CT_{max} and CT_{min} measurements were not significantly different (all $p > 0.05$). Box plots show medians, interquartile ranges, and minima/maxima.

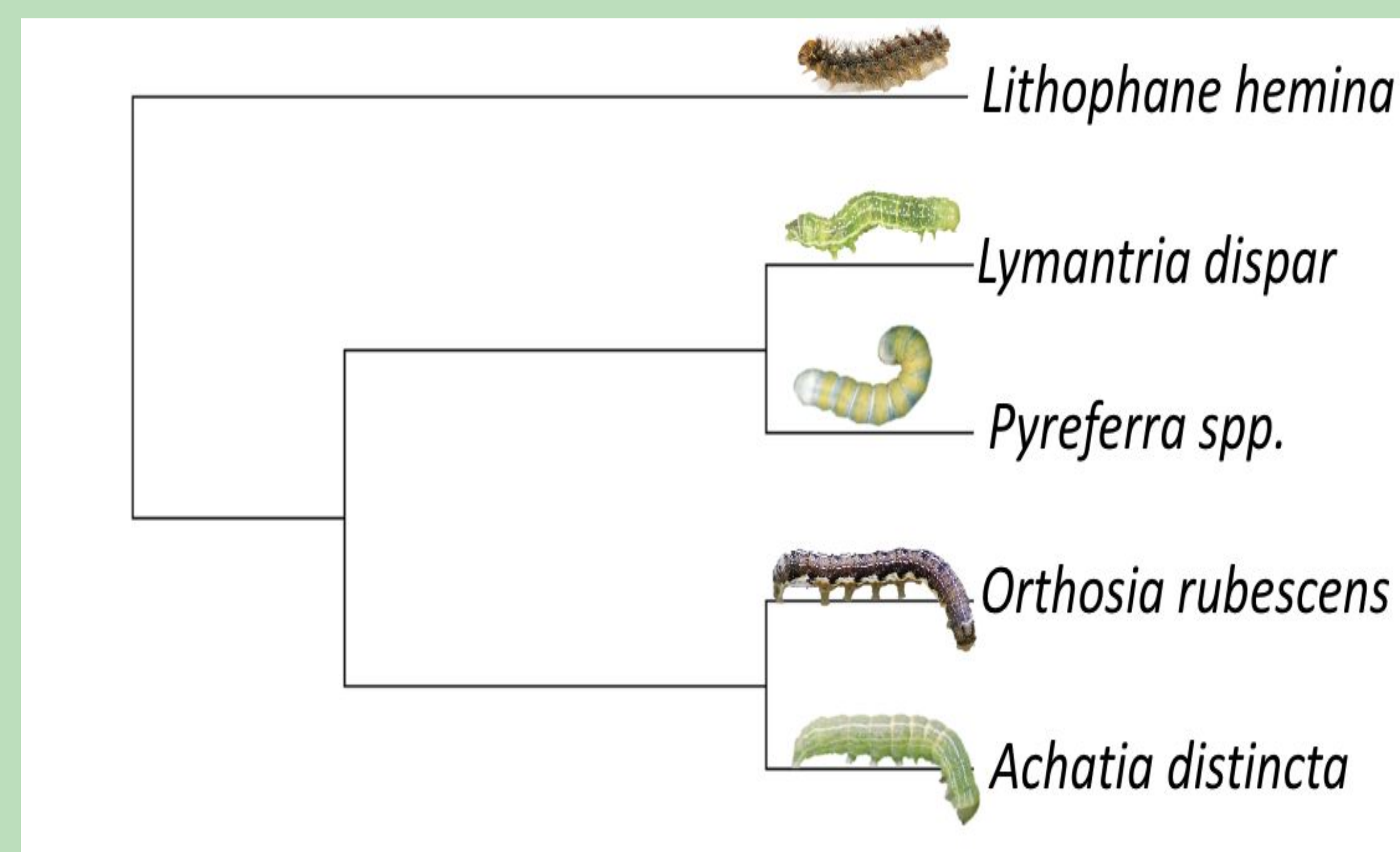


Figure 3. Phylogenetic tree representing five of the collected species. Pagel's lambda test indicated no evolutionary correlations with CT_{min} and CT_{max} ($p > 0.05$).

RESULTS

- The CT_{max} , CT_{min} , and thermal range measurements showed no significant relationship between body mass and thermal tolerance
- CT_{min} and CT_{max} measurements were found to be similar among species

CONCLUSIONS

- Similar environments may lead to similar thermal tolerances
- There is no significant effect of body mass on CT_{min} and CT_{max}
→ Previous studies established a relationship between matured individuals' biomass and thermal tolerance for some species^{3,4}
- Thermal tolerance may be influenced by other factors such as season of birth or parasites

FUTURE RESEARCH

- Determine thermal tolerance range of caterpillars born in different seasons
- Determine the effect of thermal tolerance range on reproductive rates
- Determine whether parasitoids influence caterpillars' thermal tolerance

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References:

