

Investigating the Thermal Performance of Fossorial Species

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Background

Fossorial species = species that spend the majority of their lives underground

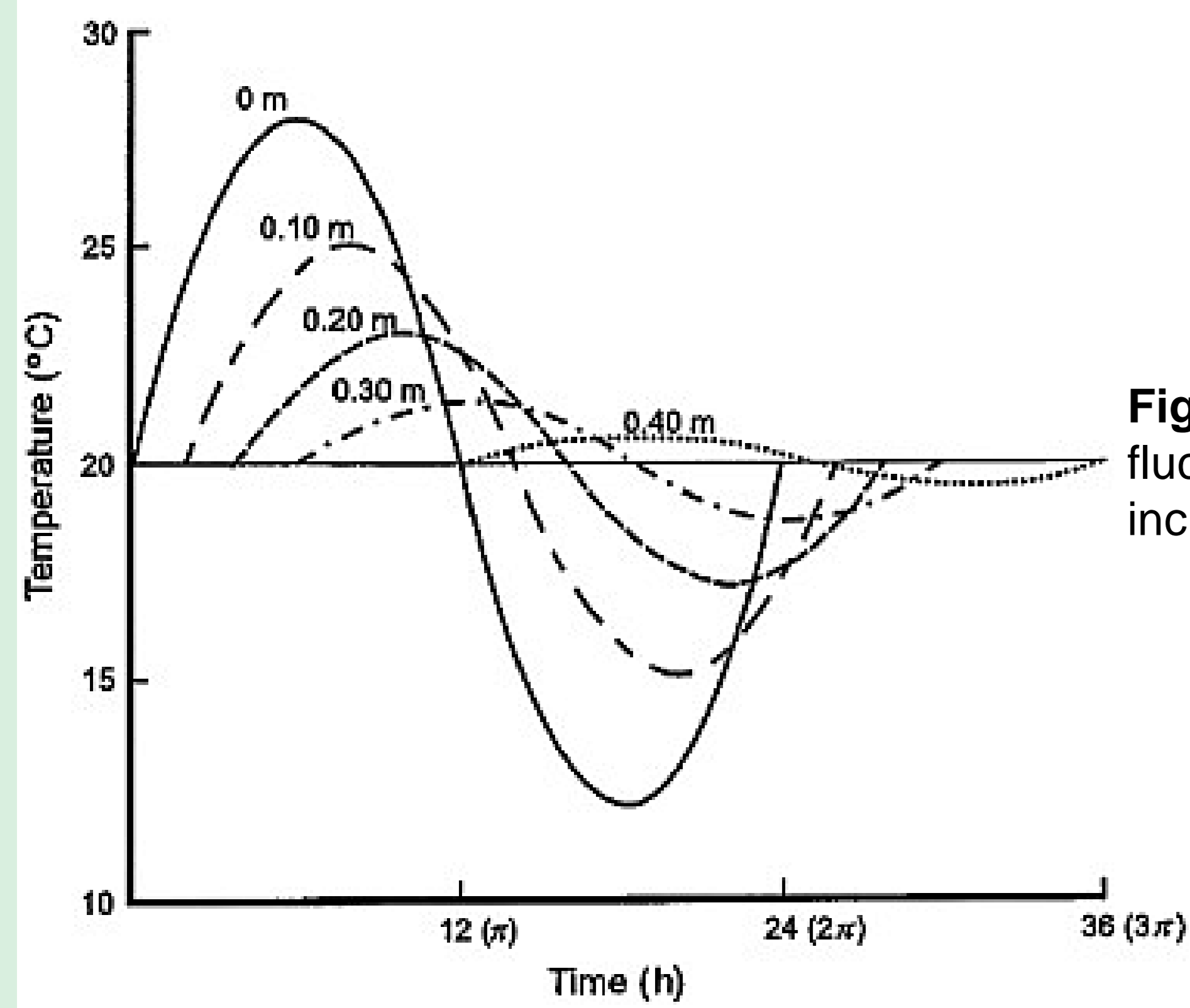
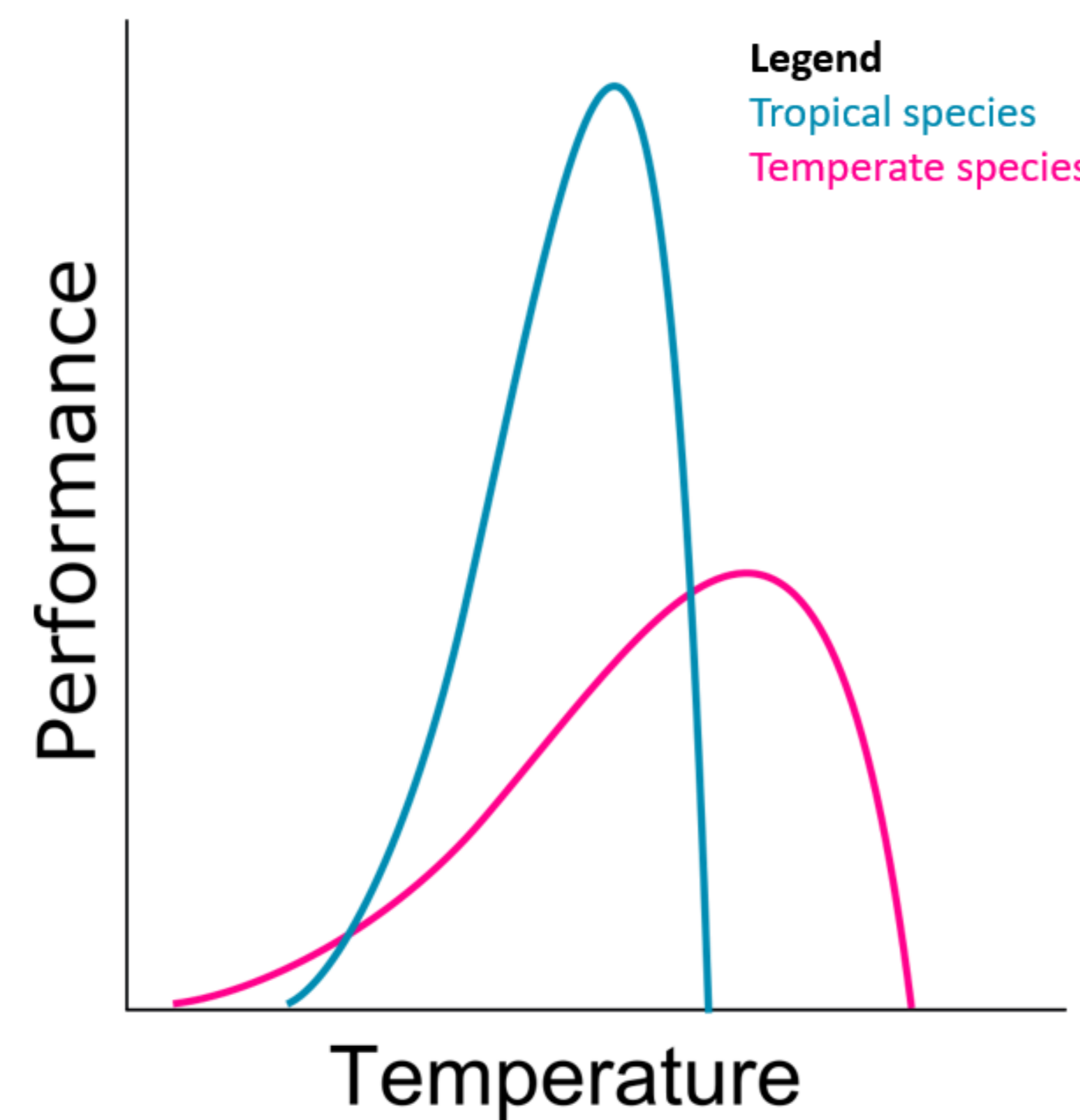


Figure 1. Soil temperatures fluctuate less as depth is increased

Figure 2. Thermal performance curves of temperate and tropical species, tropical species are exposed to a narrow range of temperatures and have a narrow thermal performance curve, temperate species are exposed to a broad range of temperatures and have a broad thermal performance curve



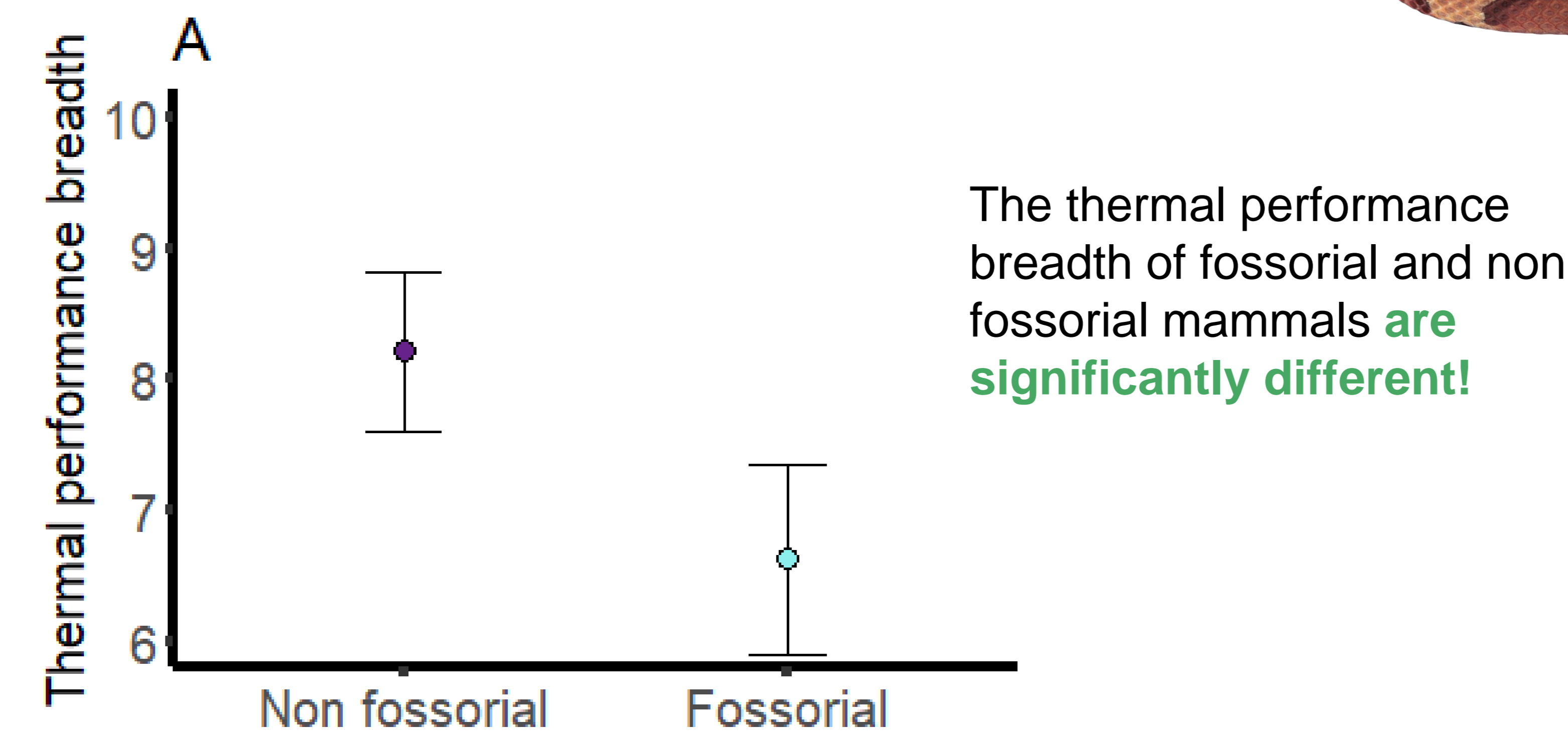
Hypothesis: We assume that fossorial species are exposed to a narrow range of temperatures, therefore, they should evolve a narrow thermal performance breadth

Methods

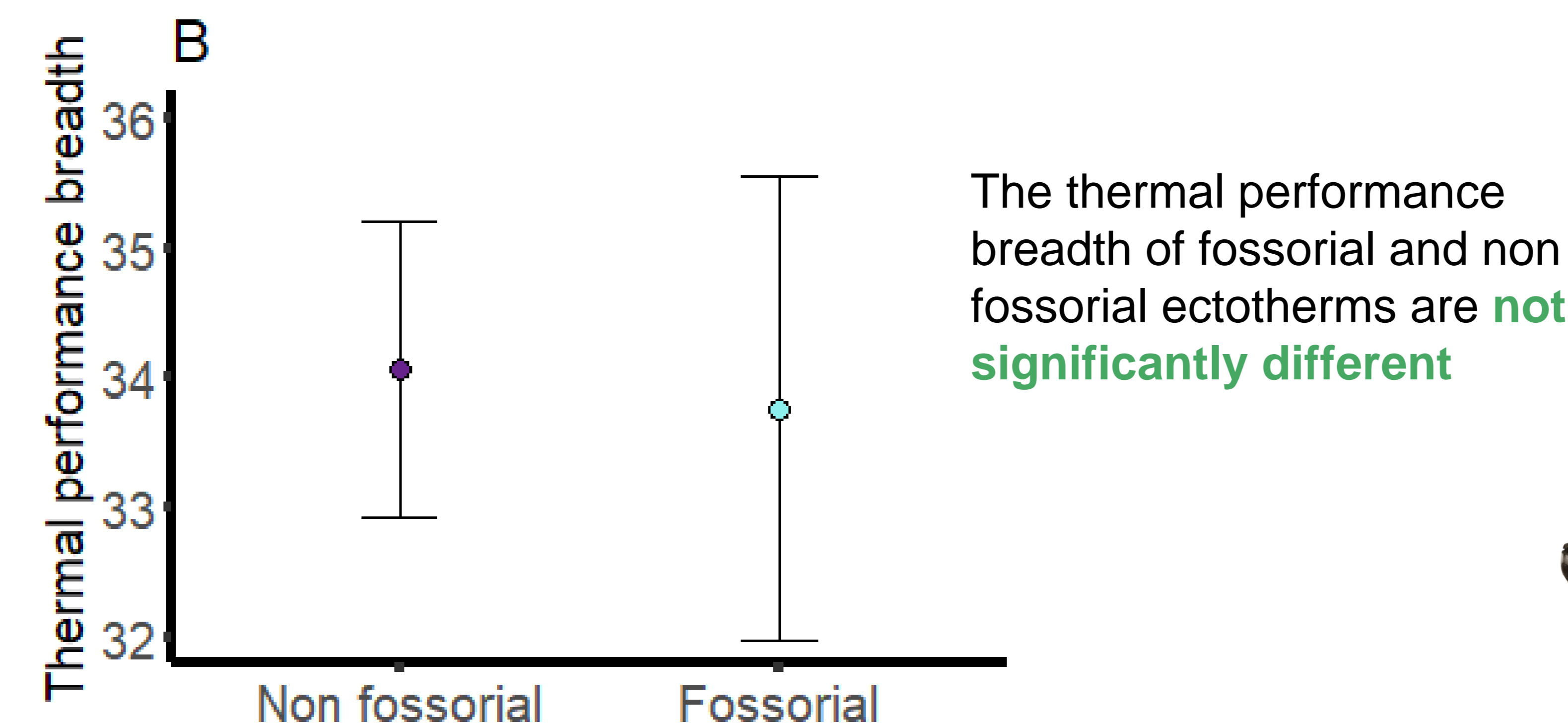
Data collection: Used the Sunday thermal tolerance database and classified ~1000 species as fossorial or not

Linear mixed effects model: created two LME models for mammals and ectotherms, fixed effects included fossorial classification, range difference between critical thermal maximum and minimum, and the difference between the environment maximum and minimum, random effects included family and order

Results



The thermal performance breadth of fossorial and non fossorial mammals **are significantly different!**



The thermal performance breadth of fossorial and non fossorial ectotherms are **not significantly different**

Figure 3. A) Thermal performance breadth for mammals (n = 200) B) Thermal performance breadth for ectotherms (n = 184)

Conclusion

Ectotherms

- Fossorial ectotherms **do not** have a narrower thermal performance range

Mammals:

- Fossorial mammals **do** have a narrower thermal performance range!
- Fossorial mammals have a **higher thermal minimum** than non fossorial mammals

Next steps?

- Include other variables of interest to explain thermal limits, such as body size
- Assess whether fossorial species will be at a greater risk to negative climate change impacts

Acknowledgements

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References

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