



Does maternal stress drive offspring dispersal in an asocial mammal?



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Introduction

Offspring behavior is a complex outcome of genetic makeup, maternal effects, environmental influences, and social interactions¹. In species where only males are forced to move away, maternal stress is key in defining whether female pups choose to remain in their natal environment (e.g. philopatric behavior) or leave (e.g. dispersal behavior) upon weaning^{2,3}.

Hibernating species offer insight into the effects of maternal stress because offspring are reared in burrows and only interact with the outside environment through their mothers^{2,4}. During lactation, hormones such as corticosterone, produced in response to stressors, can pass from mothers to offspring^{2,5}.

The golden-mantled ground squirrel (GMGS) (*Callospermophilus lateralis*) is a hibernating mammal that chooses philopatry or dispersal at weaning.

The purpose of this study is to test whether maternal stress affects philopatric behavior of daughters using glucocorticoid concentrations (GCC) as an index of maternal effects.

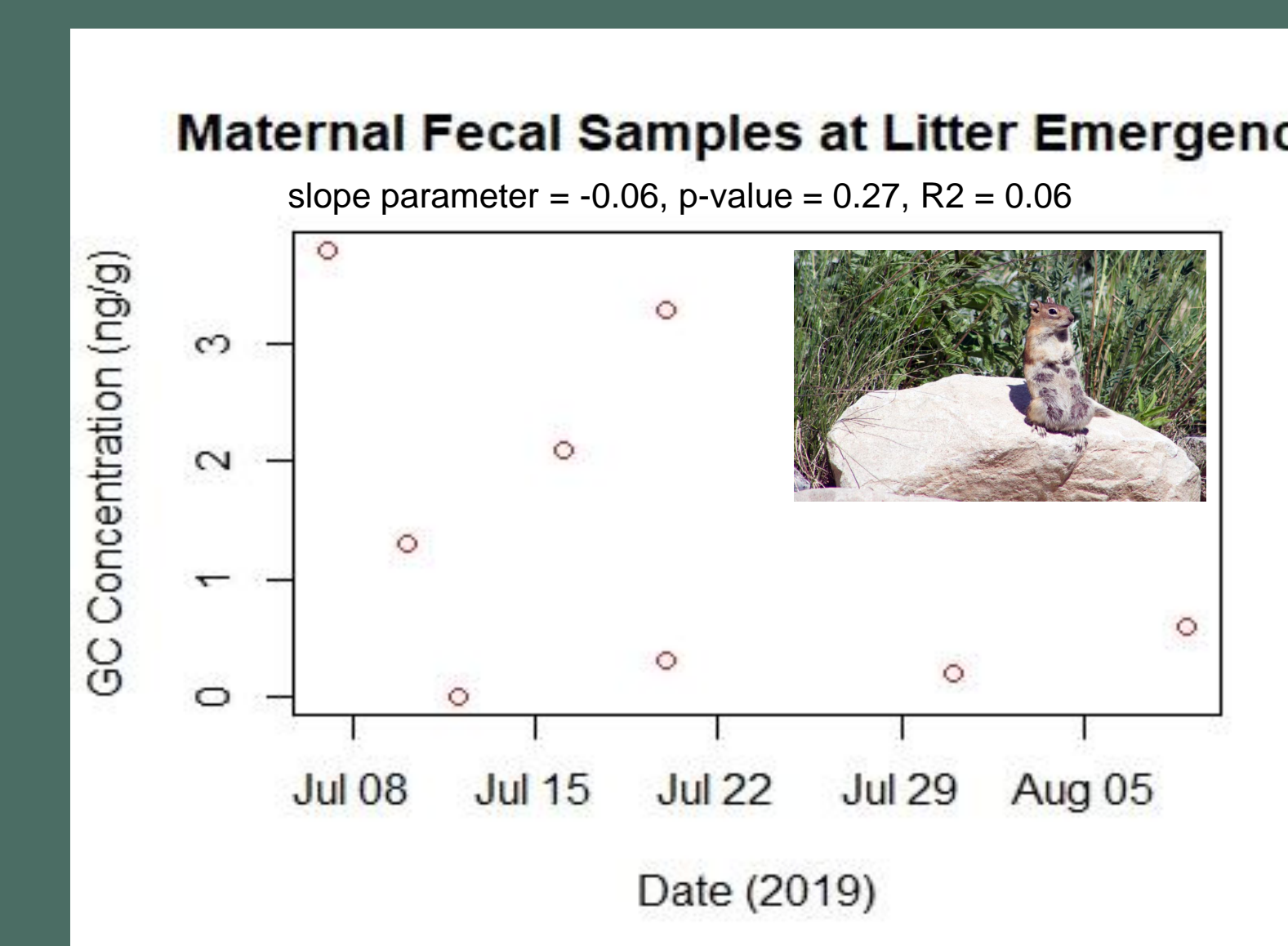
Methods

We study a population of GMGS located at Rocky Mountain Biological Research Laboratory (RMBL) in Gothic, Colorado. Mothers are trapped during lactation and daughters are trapped upon emergence from their natal burrow using Tomahawk traps.

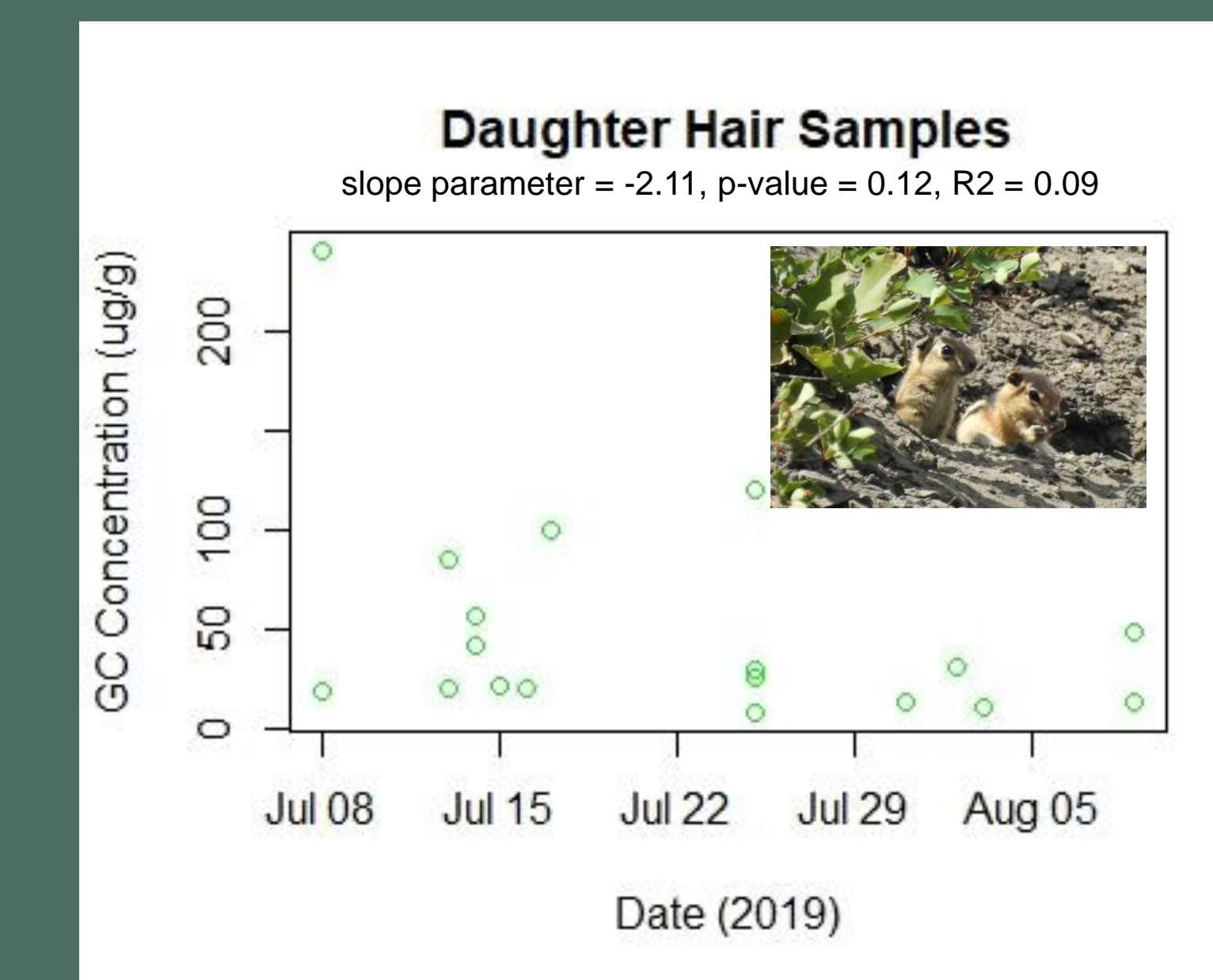
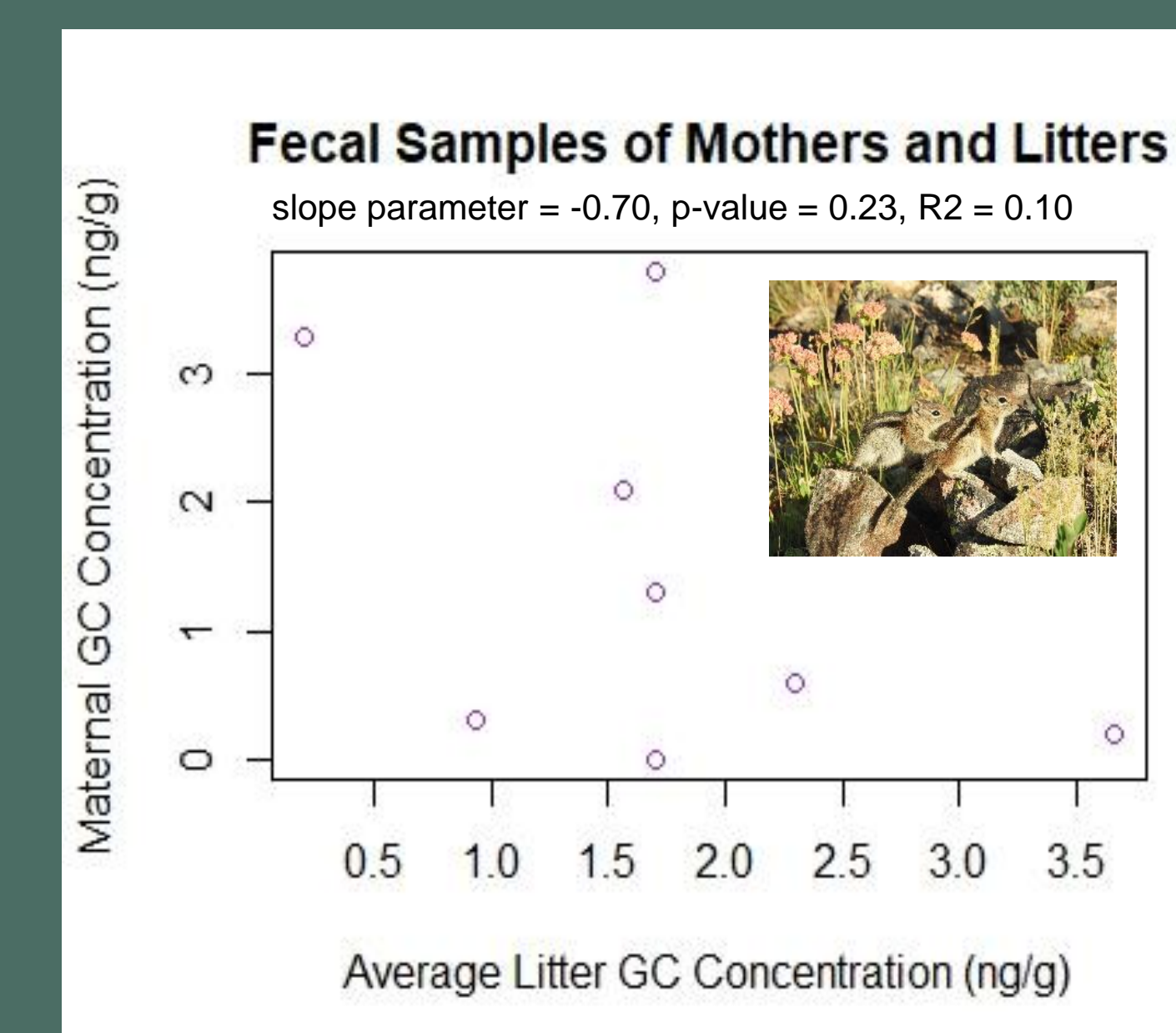
All individuals are fitted with metal ear tags, weighed, and measured. Hair and fecal samples are collected, and an ELISA kit is used to quantify corticosterone concentrations in both types of samples⁶. We record whether daughters disperse or remain philopatric to the study area the following year.

Preliminary Results

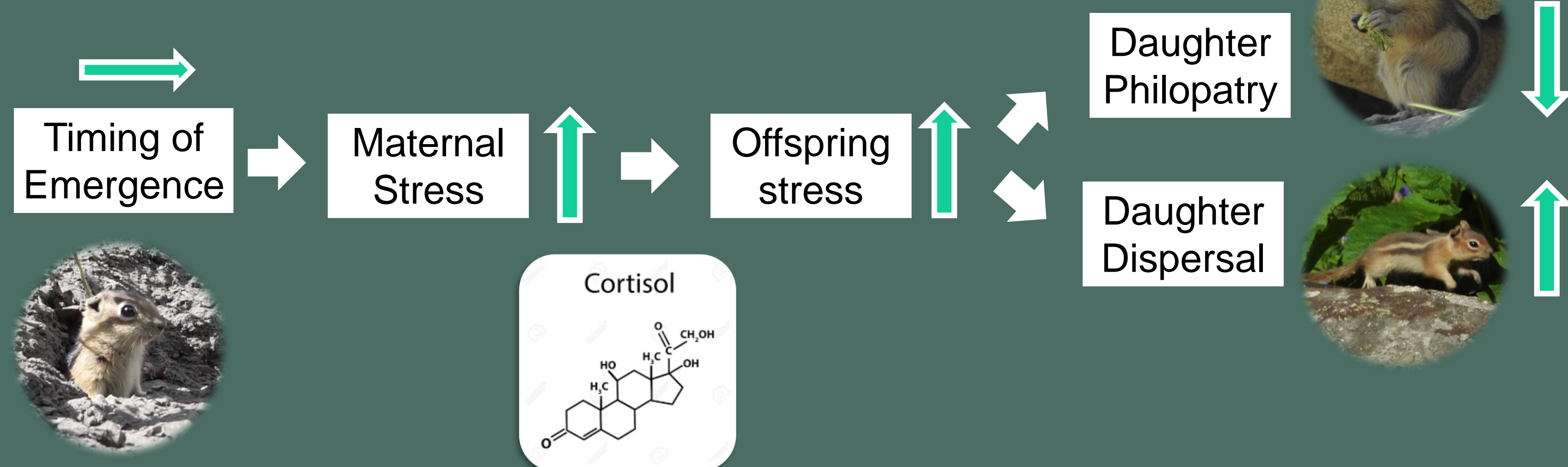
Prediction (i) was not significantly supported based on the relationship in GCC in fecal samples collected from mothers at litter's emergence.



Prediction (ii) was not significantly supported in either GCC in fecal samples from mothers and daughters at litter emergence or in GCC in hair samples collected from daughters at litter emergence.

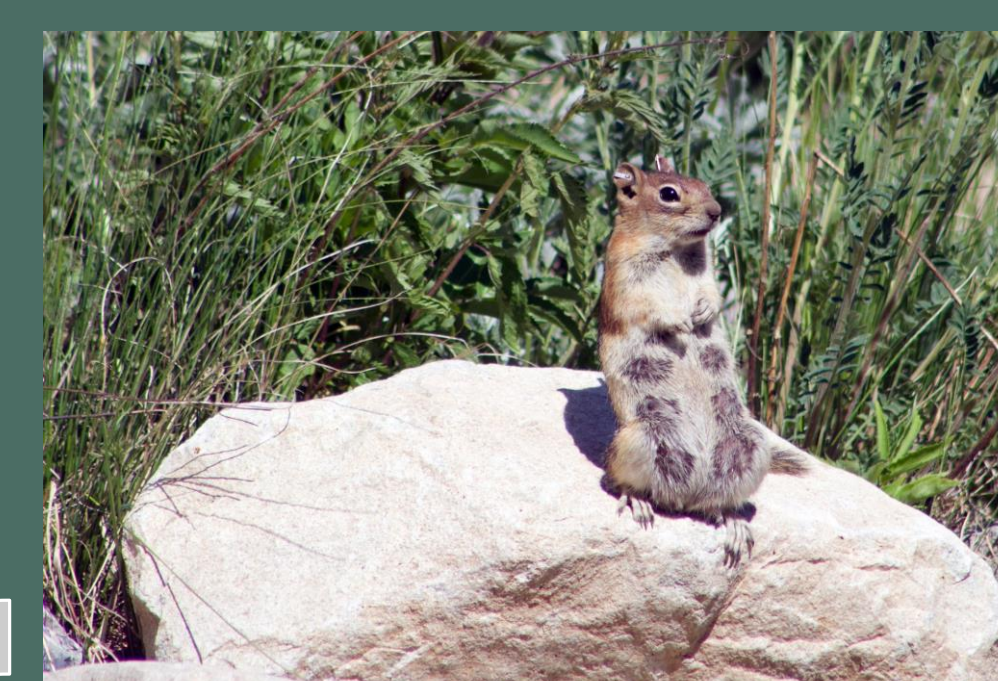
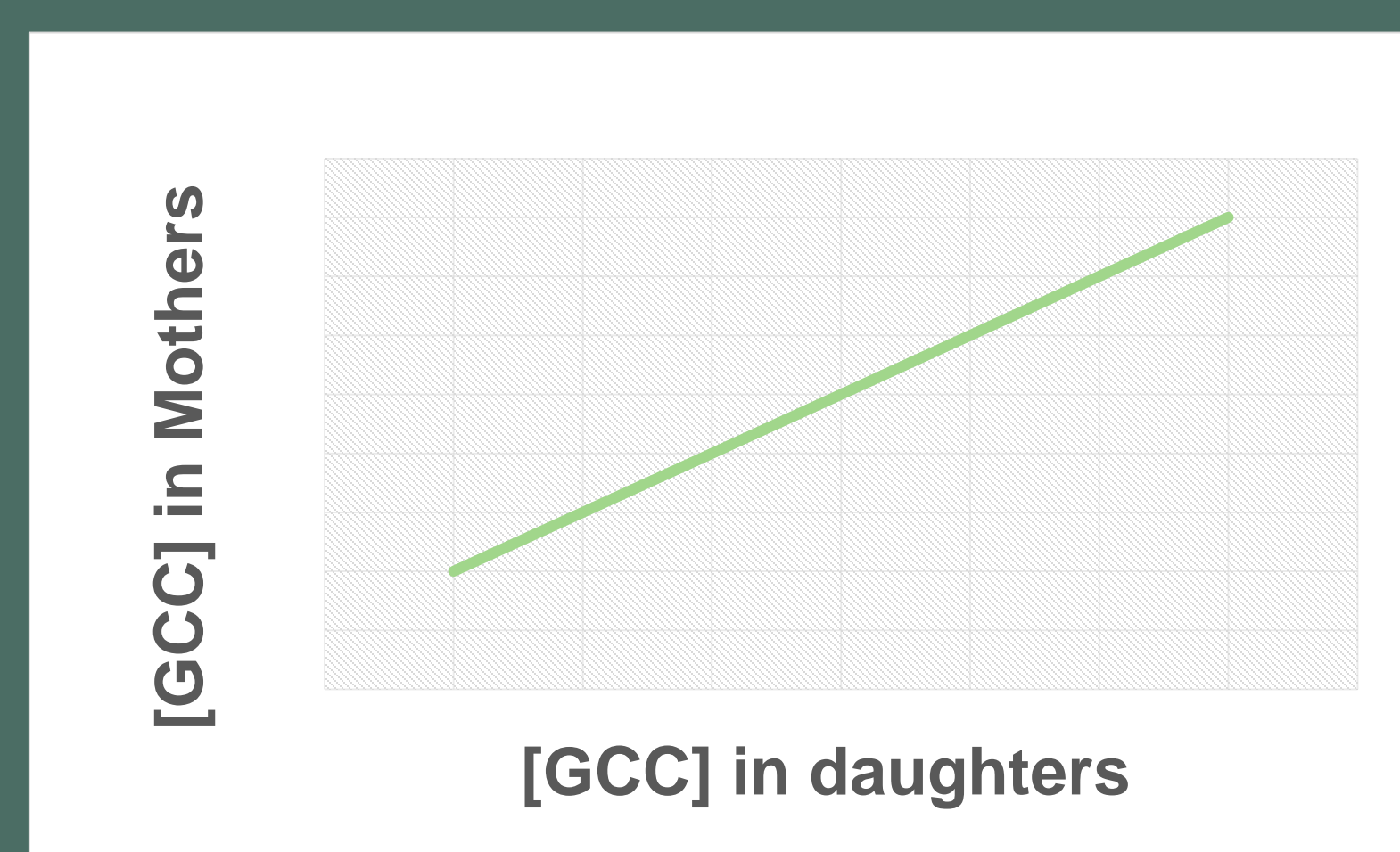
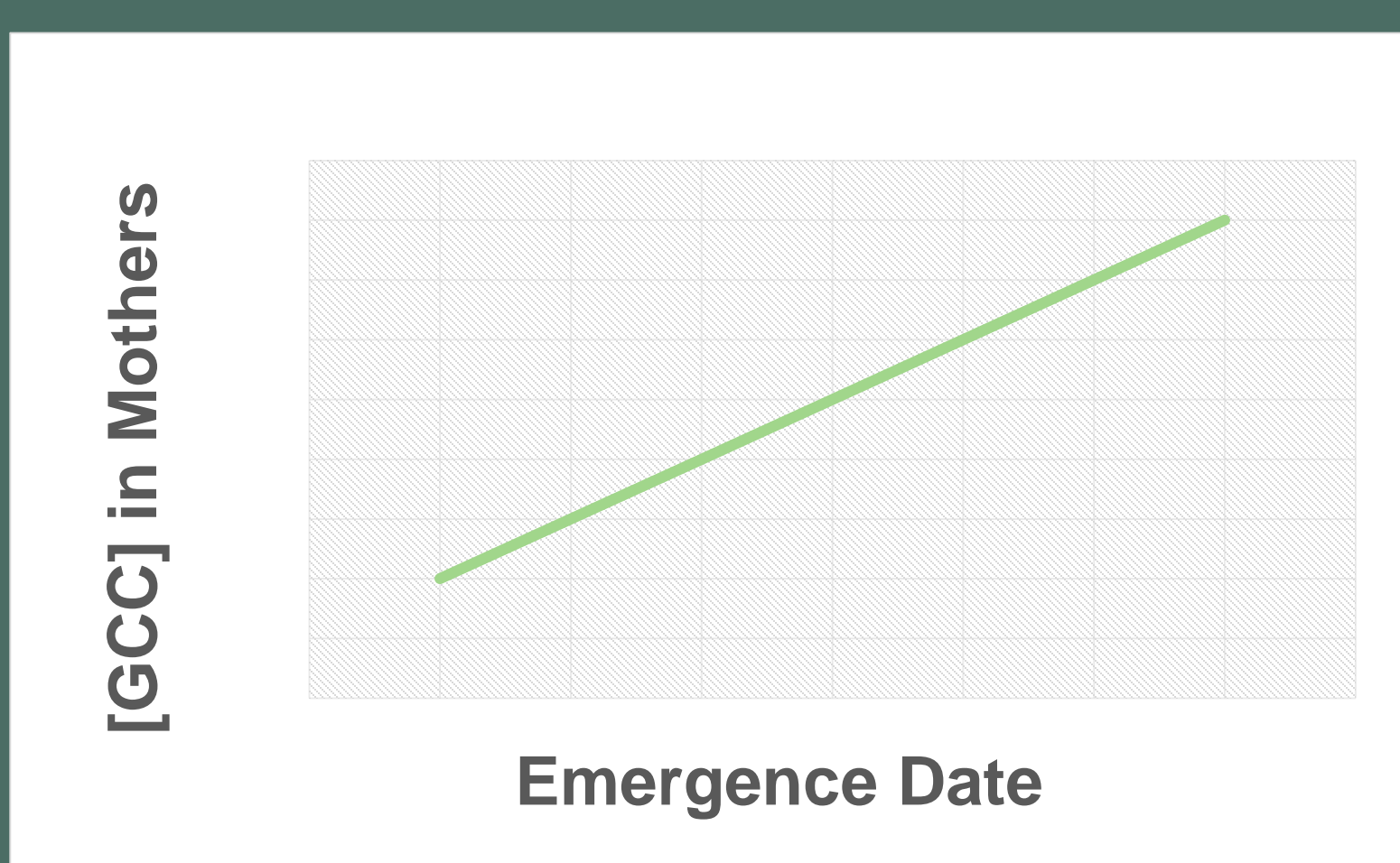


Hypotheses



Predictions

- (i) Mothers that emerge late from hibernation will experience higher intra-specific competition for access to resources, leading to higher GCC during lactation.
- (ii) We expect a positive correlation in GCC between mothers and daughters.
- (iii) Daughters that suffer higher GCC will disperse away from their natal range.



Capture lactating mothers



Capture daughters at emergence



Collect hair and fecal samples for stress analysis



Daughters disperse vs. remain philopatric the following year

Future Research

To improve our ability to address our hypotheses and predictions, we propose to:

- 1) Increase sample size by adding two field seasons to the data collection process.
- 2) Sample mothers and yearlings at emergence in future years to better test predictions (i) & (ii). Collect additional fecal and hair samples from mothers and daughters at emergence, during lactation, and prior to entrance into hibernation to establish fecal GCC profiles throughout the growing season.
- 3) Use hair and fecal samples collected from mothers and daughters upon litter emergence to test whether short-term (i.e. obtained from fecal samples) and long-term GCC profiles (i.e. obtained from hair samples) provide similar results.
- 4) Use observational data in the following years to assess prediction (iii) and test whether daughters remained philopatric or dispersed away from their natal burrow as a function of their own stress profiles, and that of their mothers.

References

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