

Dorsal RGB variation of Ornate Tree Lizard (*Urosaurus ornatus*) from different substrates

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Introduction and Objectives

- Variation in the body color and pattern of squamates serve many ecological functions.
- “Theory predicts that animal color patterns represent a compromise between selection for signaling functions and natural selection for defense against predators” (Stuart-Fox, 2004).
- Several studies have utilized methods to understand body color variation and functions in the environment.
- How can body color be quantified?

Objectives

- Quantify natural dorsal color variation and native substrate difference of ornate tree lizard, *Urosaurus ornatus*, individuals.
- Determine if there is a significant difference in dorsal color properties (RGB) and if in association with different substrates.

Methods

Sampling

- Random sampling of 50 verified photographs of *U. ornatus* in their native environment.
- iNaturalist data with custom map boundary placement surrounding Utah, Colorado, Arizona, and New Mexico.
- Sampling across habitat area abundant with granite and red sandstone substrates (Figures 1-2).
- Only photographs including a full dorsal view were sampled.

Dorsal Color Measurements

- Analyzed RGB estimates from photographs of ornate tree lizards using Adobe Color.
- Dorsal point measurements of samples provided RGB color and gradient information.
- RGB values from the same sample and substrate were averaged for statistical analyses.



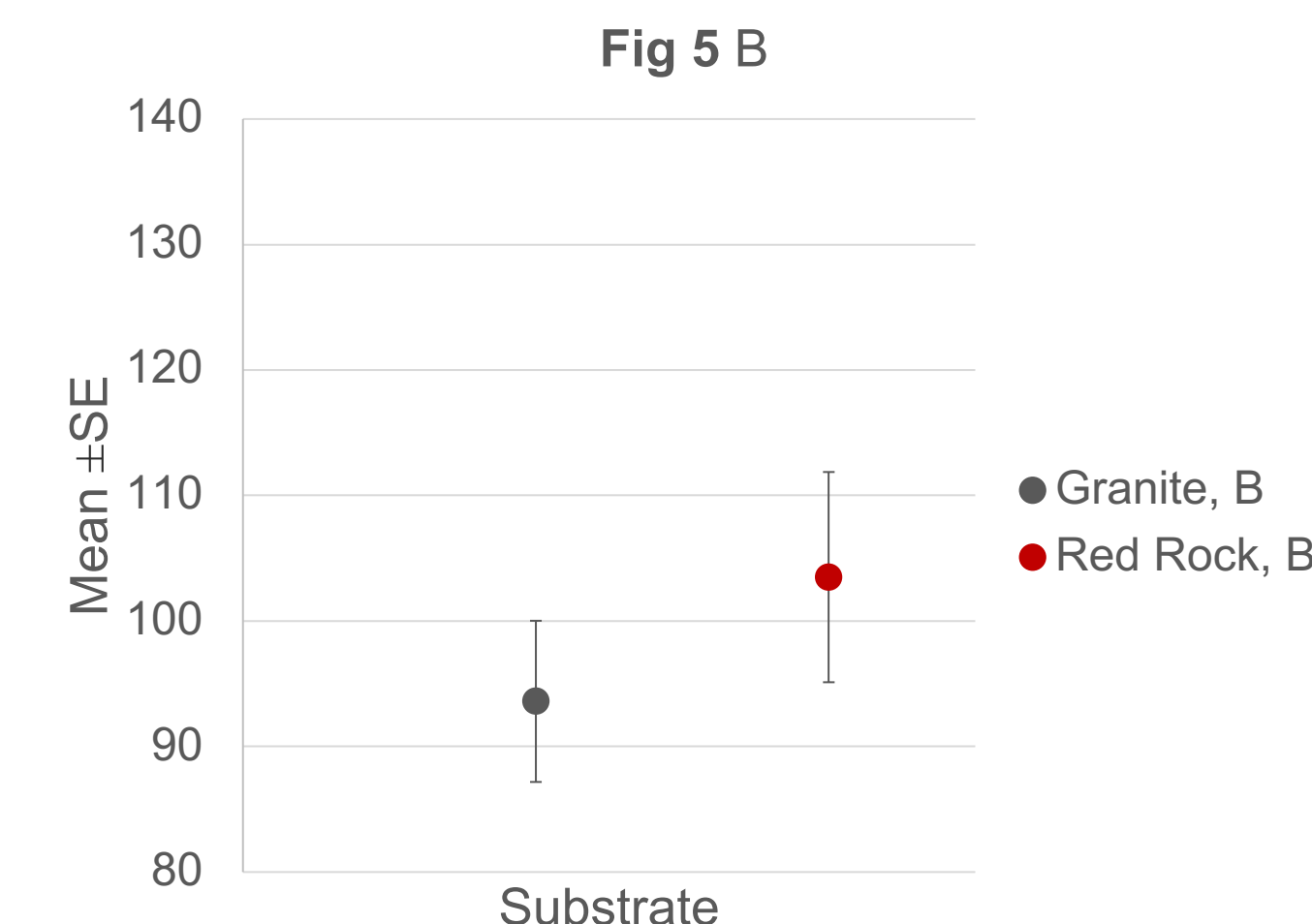
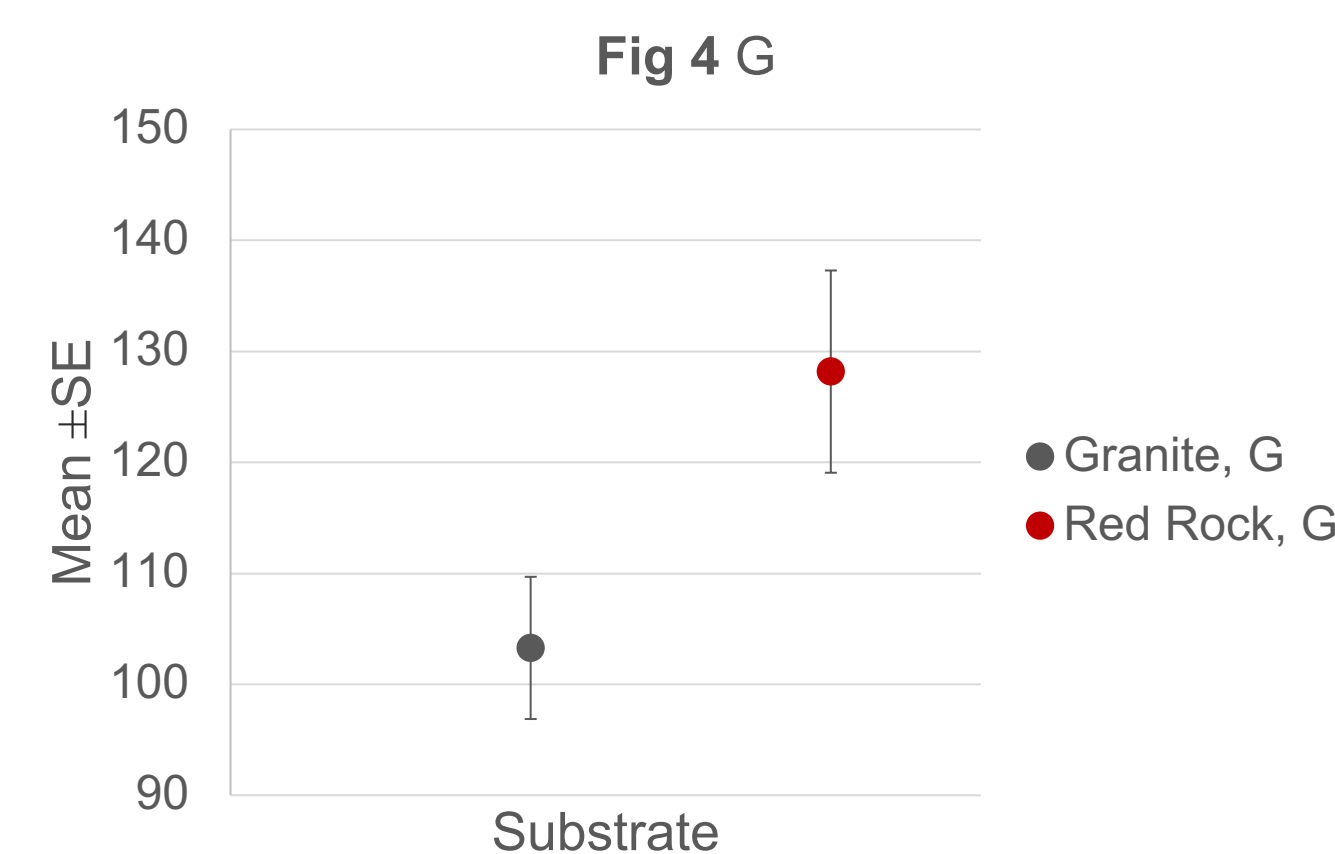
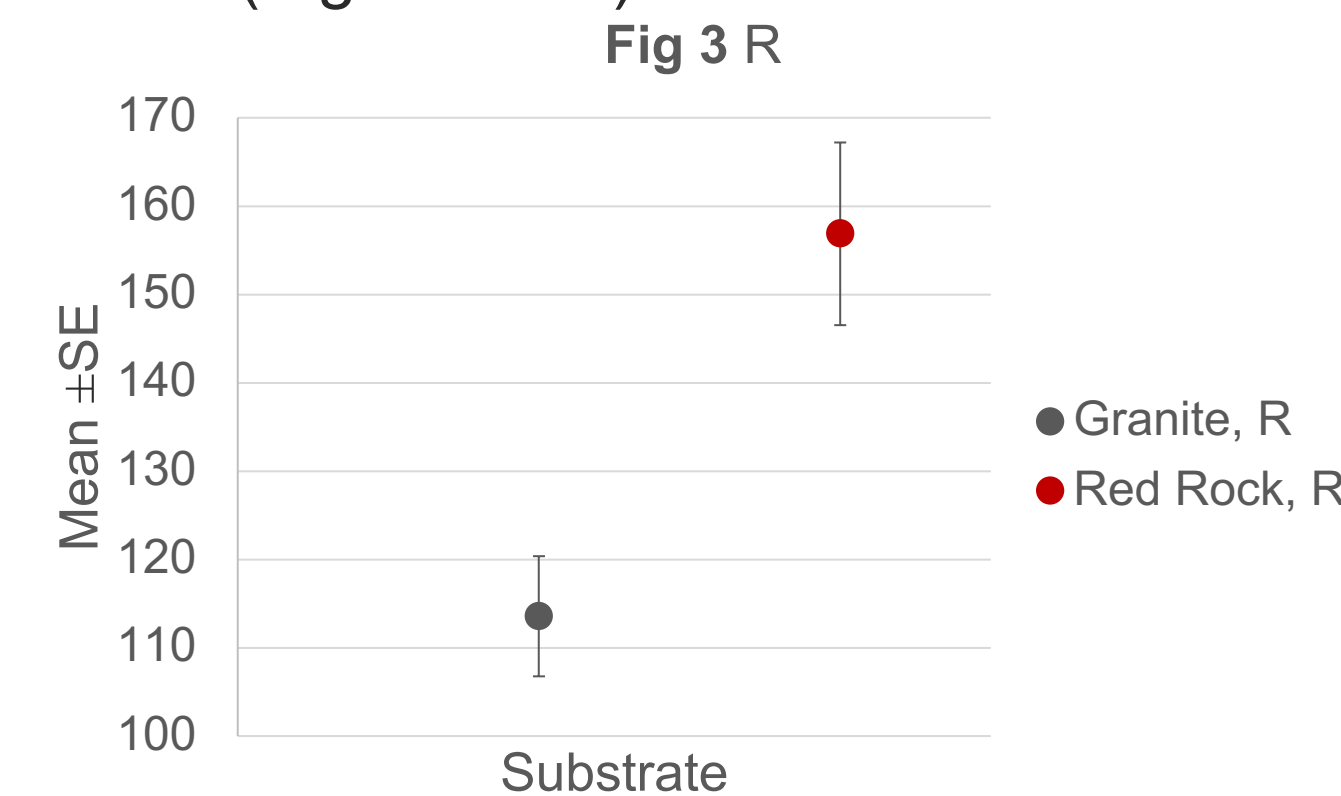
Fig 1 Granite substrate in NM, iNaturalist photo by @madalynnegatto



Fig 2 Red sandstone substrate in CO, iNaturalist photo by @katzyna

Results

- Significant differentiation on RGB values between two types of substrate.
- Higher RGB average across samples in red rock substrate than samples in granite substrate (Figures 3-5).
- Greater RGB variance of dorsal coloration in samples of red sandstone areas (Figures 3-5).



Figures 3, 4 and 5 represent the average and variance of R, G, and B values from dorsum of ornate tree lizards, *Urosaurus ornatus* (n=50) across native substrate.

Results

- Visual results reveal a diverse color range across sample size.
- High RGB values indicate a lighter color while low RGB values indicate a darker color.
- Cool tone color across granite substrate and warm tone color and variety across red rock substrate (Figure 6).

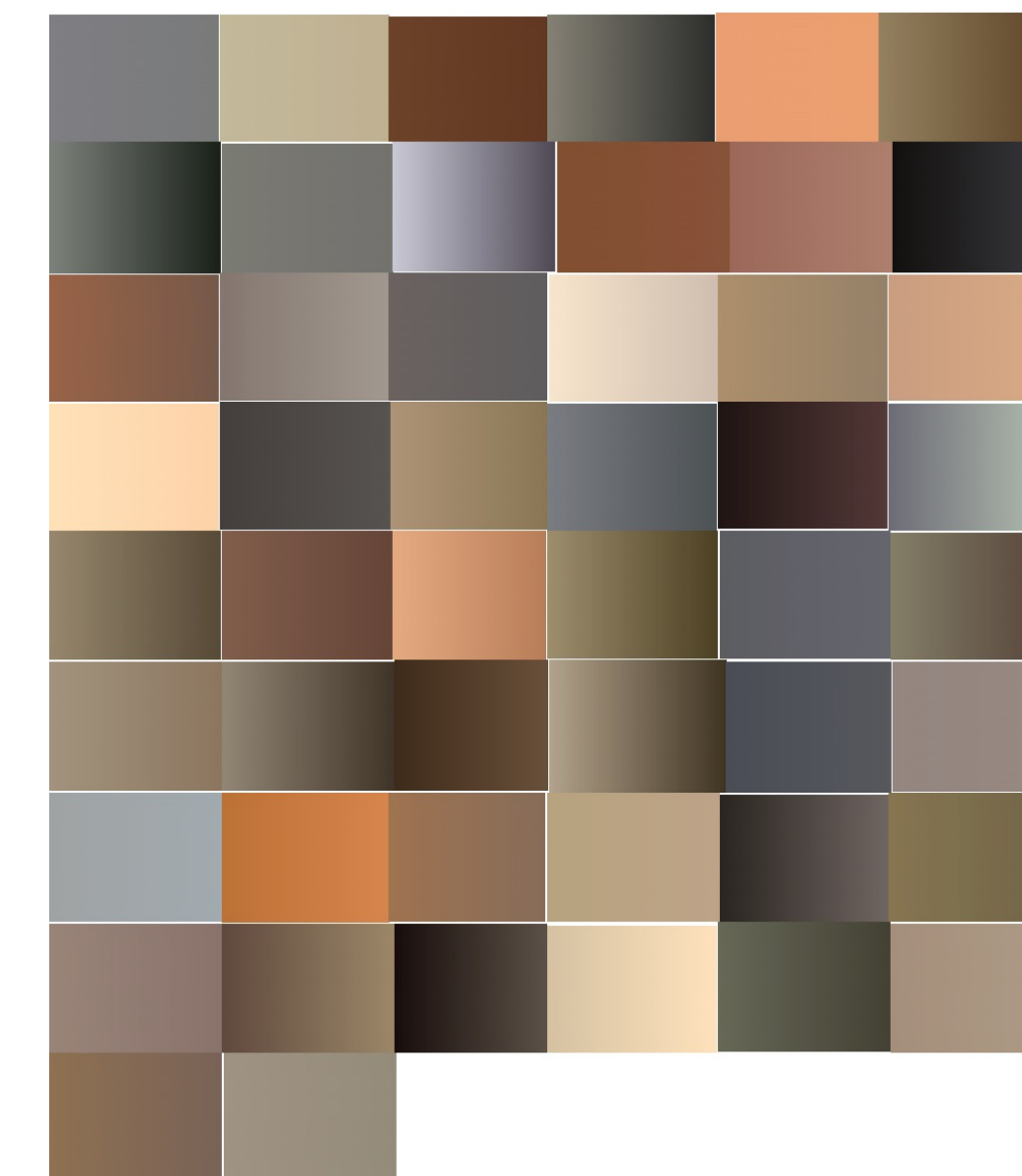


Fig 6 Visual representation of dorsum color variability.

Discussion

- “Coloration plays a significant role for animals to adapt to variable environments” (Tong, 2019).
- This research supports conclusions revealing the association with dorsal color variation and native habitat features such as substrate color.
- Quantifying body color in animals can be challenging, this research implies the efficiency and convenience of point measurement methods.
- These methods can provide interesting results and reveal interactions between a species and their environment.

Literature Cited & Acknowledgements

Stuart-Fox, D.M. Moussalli, A. Johnston G.R. and Owens, I.P.F. 2004. Evolution of color variation in dragon lizards: quantitative tests of the role of crypsis and local adaptation. *Evolution* 58(7):1549-1559.

Tong, H. Li, J. Wo, Y. Shao, G. Zhao, W. Aquilar-Gómez, D. and Jin Y. 2019. Effects of substrate color on intraspecific body color variation in the toad-headed lizard, *Phrynocephalus versicolor*. *Wiley* 9:10253-10262.

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