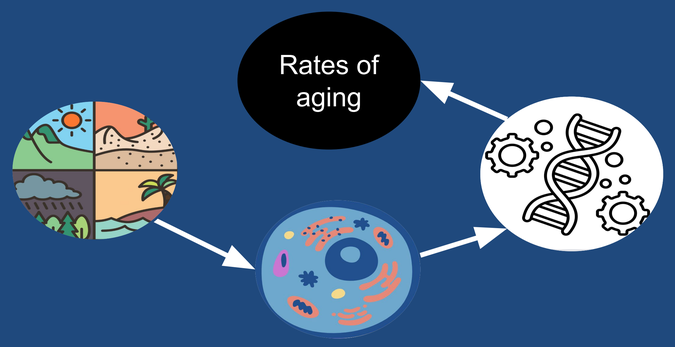

Rates of aging, reactive oxygen species, and their relationship to mitochondrial genome features in ectotherms

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Introduction

- While we have identified the key hallmarks of aging, our understanding of how aging evolves across different species remains limited
- Research on aging in ectotherms is significantly less common than in mammals and birds
- To address this knowledge gap we asked the following questions: 1) Does mtDNA base composition affect rates of aging in ectotherms? and 2) Does temperature affect ROS production in reptiles?

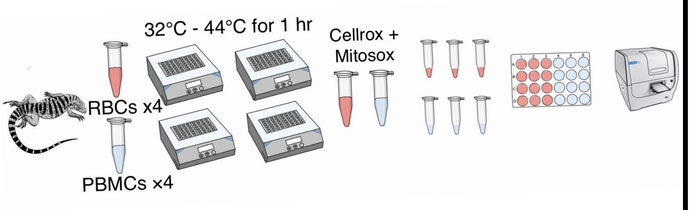
Methods

mtDNA base composition:

- Download mitochondrial genomes from Reinke et al. 2022 using NCBI's E-utilities.
- Obtain aging rates from Reinke et al. 2022, estimated by the Gompertz slope parameter.
- Produce genome summary statistics using the R package seqinR.
- Perform Pearson's correlation and PGLS to test base composition vs. mean aging rates.

ROS Measurements:

- Study species*: Chrysemys picta, Salvator merianae*, and *Thamnophis elegans*



Results

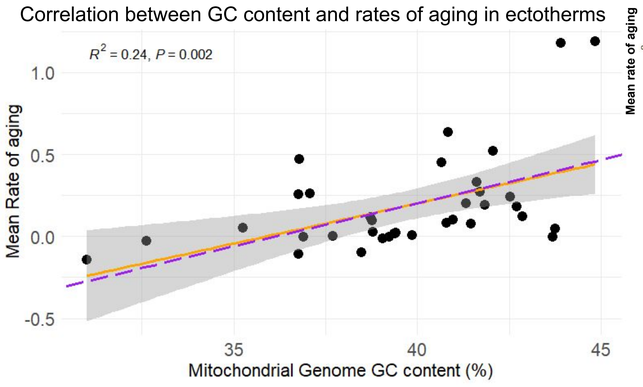


Figure 1: Correlation between GC content and mean rates of aging. Ordinary Least Squares regression line in orange, Phylogenetic Generalized Least Squares presented in purple.

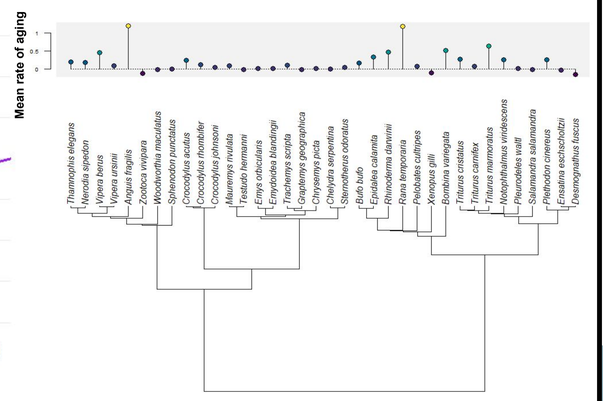


Figure 2: Phylogenetic relationships among species, and rates of aging on top (obtained from Reinke et al 2022).

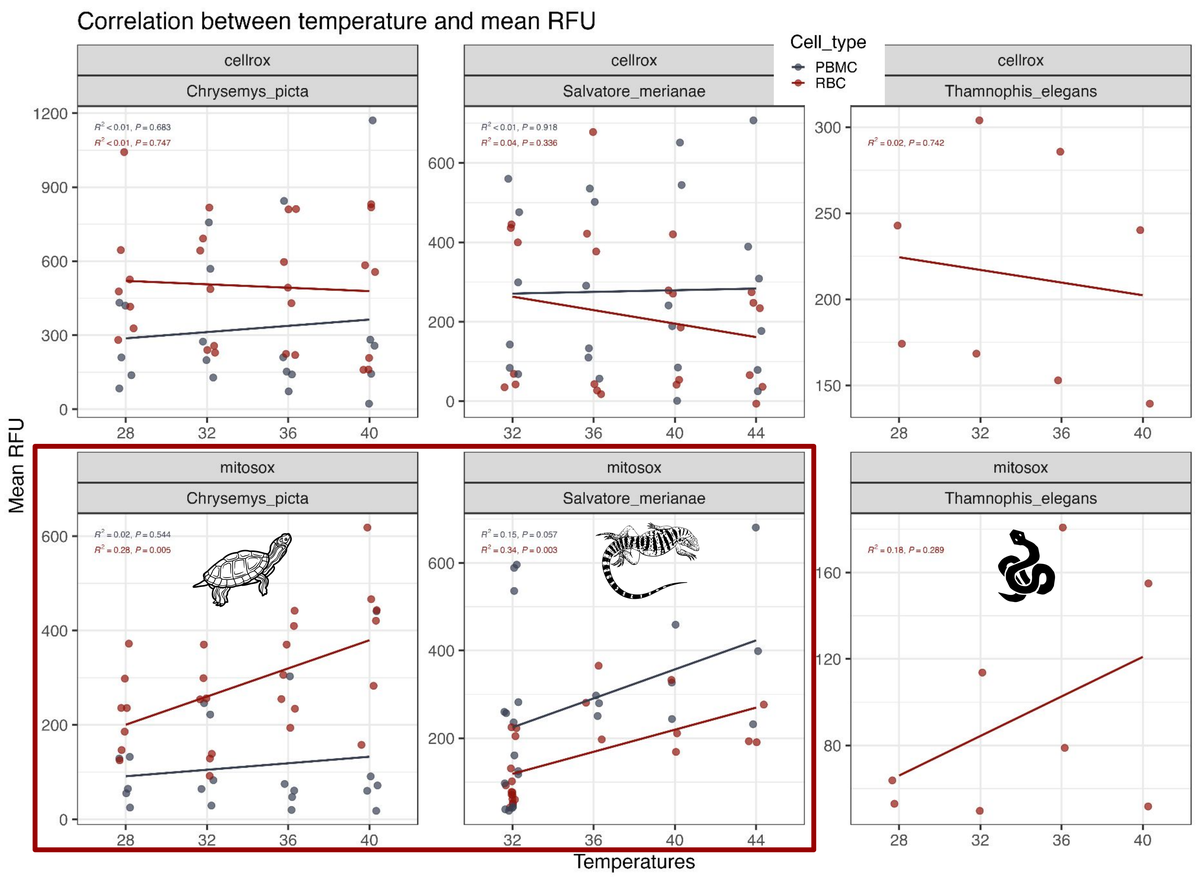


Figure 3: Correlation between temperature and mean Relative Fluorescence units among species. Colors represent different cell types. For T. elegans we used pooled blood. Significant results are indicated by a red box.

Discussion

- We observed that GC% has a moderate positive correlation with mean rates of aging in ectotherms, even when taking into account the phylogenetic relationships between species
- We also found that increases in temperature resulted in higher production of superoxide (Mitosox fluorogenic dye) for RBCs in *C. picta* and *S. merianae*, and PBMCs in *S. merianae*.
- These results are partially consistent with the hypothesis that temperature increases can increase oxidative damage, but we are finding that different cell types and different species react quite differently.

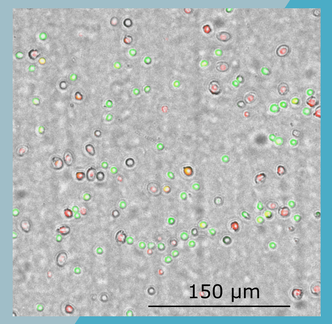


Figure 4: Microscopy image of Cellrox Green and Mitosox Red Fluorescent dyes in RBCs and PBMCs.

Next Steps

- Cellrox RFU and temperature increases showed no correlation while Mitosox RFU values were shown to increase with temperature. Perhaps look for a mechanism that acts as a "buffer"?
- Is there differential ROS production between the sexes and age classes?

Acknowledgements

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