Background: urbanization and oxidative stress

House Finches are native to the southwest and occur in both natural desert and urbanized habitats.

Oxidative stress is the state in which the amount of reactive oxygen species (ROS) exceeds the antioxidant capacity of the body, leading to cellular damage [1].

Urban environments might increase oxidative stress through a several sources [1] including:

• Air pollution, especially NOx compounds
• Food sources with poor nutrition (lack of antioxidants)
• Increased prevalence of diseases

Age could affect ability to cope with the above stressors.

We hypothesized that measures of oxidative stress would differ as a function of:

• Age
• Health status (higher in birds infected with avian pox)

Recently independent juveniles experience more oxidative stress

• Juveniles had higher reactive oxygen metabolites (ROMs) in plasma, which result from oxidative damage (Fig. 2).
• Juveniles had higher uric acid levels in plasma (an antioxidant), though this was not significant after Bonferroni correction (Fig. 3).

Conclusions

• Juveniles experience oxidative stress differently than adults, possibly due to increased metabolism.
• Age groups might respond differently to the same external stressors.
• Antioxidant levels correlated with oxidative damage.

Future Directions

This study is the start of a multi-year monitoring project to determine the effects of urbanization on house finch physiology, fitness, and behavior.

We will begin sampling non-urban finches this winter for comparison to urban populations.

We will introduce additional measures including:

• Catalase activity (an antioxidant enzyme)
• Corticosterone levels (a "stress" hormone)
• Total antioxidant capacity
• Exploratory behavior

Acknowledgments

Thank you to the Central Arizona Project (CAP) LTER for funding this research. Arizona State University helped fund Sarah Polekoff’s conference expenses. Thanks to Kevin McGraw and his lab for lending us supplies. House Finch photo by uzun at iNaturalist.