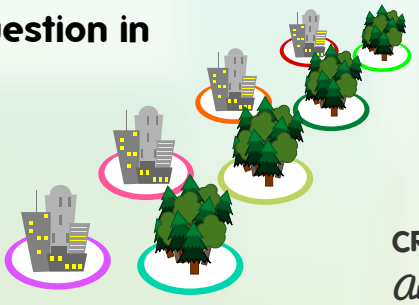
The right temperature

Though some species fare well in cities, we still don't know exactly **how** evolution and (maybe eventually) adaptation occur. One tempting question is whether populations evolve in **parallel**. That is, faced with the same environmental hurdle, do all populations find the same way over?

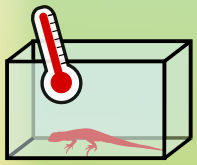
A major difference between cities & forests is **temperature**: cities are typically **hotter** than their surroundings. Because this effect is consistent, we can ask whether urban populations adapt to heat in the same ways.

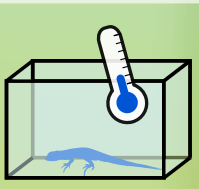
A team led by Dr. Shane Campbell-Staton and Dr. Kristin Winchell tackled this question in crested anoles.

They sampled 4 urban & forest **population pairs** from different parts of Puerto Rico.



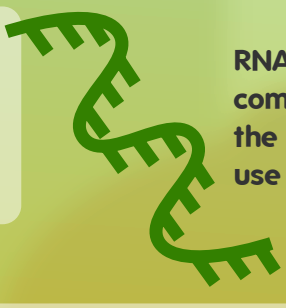
CRESTED ANOLE
Anolis cristatellus





They first exposed anoles to a temperature range to record differences in thermal tolerance. Urban lizards could stand **higher** temperatures than forest lizards!

The team then analyzed RNA data and found that a **gene** called RARS differed between urban and forest anoles, which may be the **source of their different heat tolerances**.



RNA is a cousin of DNA that can come in single-helix forms. It's the template cellular machines use to make proteins.

Genes are expressed at different rates in cells depending on which proteins (& how much) the cell needs.

Finally, they compared levels of **gene expression** between the two groups, determining that not just RARS is involved, but a whole **network of genes** that together affect heat tolerance.

Evolution and adaptation can happen in the same ways in different populations.

(and it can happen pretty quickly too!)

Reference

Campbell-Staton, S.C., Winchell, K.M., Rochette, N.C., Fredette, J., Maayan, İ., Schweizer, R.M., and Catchen, J. 2020. Parallel selection on thermal physiology facilitates repeated adaptation of city lizards to urban heat islands. Nat. Ecol. Evol. 4(4): 652–658. doi:10.1038/s41559-020-1131-8.