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Digest

Digest: Parks aren't just for us: city parks as archipelagos for the study of rapid evolution

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This article corresponds to Jackson, N., Littleford-Colquhoun, B. L., Strickland, K., Class, B., & Frere, C. H. (2022). Selection in the city: Rapid and fine-scale evolution of urban eastern water dragons. *Evolution*. https://doi.org/10.1111/evo.14596.

Abstract

Can city parks provide adequate environments for studying rapid evolution? Jackson et al. (2022) found divergent selection is contributing to significant rates of phenotypic divergence across city populations of the eastern water dragon (*Intellagama lesueurii*), suggesting city green spaces may be ideal for the study of rapid evolution in urban populations.

Oceanic islands are ideal environments for rapid phenotypic change, and provide scientists with the opportunity to study evolution in real time (Losos & Ricklefs, 2009). Much like archipelagos, city parks and other urban green spaces are home to populations that are often separated from one another by expanses of uninhabitable terrain. A study focused on the eastern water dragon (*Intellagama lesueurii*) found that those populations living in geographically close city park habitats that are isolated by urbanization showed greater morphological divergence than those living in geographically distant native habitats (Littleford-Colquhoun et al., 2017). This suggests that city parks might, like archipelagos, provide an opportunity to study rapid evolution.

In this study, Jackson et al. (2022) investigate the possibility that eastern water dragons living across city park archipelagos may experience different selective pressures, leading to phenotypic divergence. Using a decade of data from a focal population, they estimated the heritability of several morphological traits. They concluded that jaw width and snout-vent length were two genetically heritable morphological traits of the seven tested. They then found that for these two traits, city parks that were geographically close exhibited signatures of divergent selection to a similar extent as native riparian populations, that were in comparison, significantly geographically isolated. Based on these results, Jackson et al. concluded that divergent selection on these two traits is contributing to the morphological divergence among city park locations.

This study helps to establish rapid phenotypic divergence within urban habitats and supports the hypothesis this divergence is adaptive, though the selective pressures driving this adaptive divergence remain untested.

City parks may be more ecologically varied than native habitats, as their functions are largely dictated by human activity (Alberti et al., 2017). Urban habitats are thought to have greater spatial heterogeneity, with particular variability in characteristics such as surface cover, plant diversity, resource availability, and human presence (Thompson et al., 2018). The higher rates of phenotypic divergence among city parks might be explained by this increased environmental heterogeneity, as varied local conditions could initiate local adaptation at finer scales.

Further research might investigate how relevant ecological variables vary among urban sites or test for local adaptation directly with reciprocal transplant studies. Consideration might also be given not only to the drivers of trait means, but also trait variances, which varied considerably among urban sites in this study (Figure 2, Jackson et al., 2022).

As the planet is urbanized, urban adaptation will become an increasingly dominant feature of contemporary evolution. This research highlights the high tempo and fine spatial scale of urban adaptation and points toward the importance and convenience of urban parks in documenting evolution in real time.

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