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Assessing Impacts of Anthropogenic Habitat Alteration on a Bahamian Lizard

OVERVIEW

Anolis sagrei

Conservation efforts traditionally focus on preventing the extinction of populations and species, but often ignore other ways in which humans are potentially impacting wild populations. Populations that are able to survive in human-altered habitats are often subject to environmental conditions that are very different from those in their natural habitat. Divergent natural selection in human-altered habitats may lead to unique phenotypes not found in natural habitats. Even if the novel traits are environmentally induced, selection pressures can alter the population's evolutionary trajectory via genetic assimilation. Anthropogenic habitat alterations can therefore have long-term effects on populations inhabiting disturbed areas.

The brown anole, *Anolis sagrei*, provides an ideal opportunity to examine the full effects of human disturbance. *A. sagrei* is a habitat generalist and is able to thrive in natural areas untouched by humans as well as areas that have been greatly impacted by habitat alteration. Data indicate that there are intraspecific morphological differences between *A. sagrei* in natural and disturbed habitats across several islands in the Bahamas. Individuals in disturbed sites are significantly larger (snout-vent length) and heavier per unit SVL, than individuals in natural sites. In addition, individuals in disturbed sites have longer size-adjusted limbs than individuals in natural sites. My current research focuses on investigating the mechanisms underlying these observed morphological shifts in *A. sagrei.*

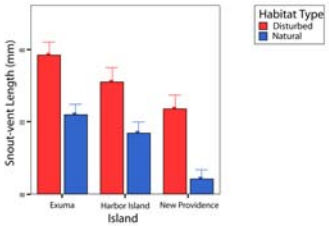

Figure 1 Differences in snout-vent length between disturbed and natural study sites (N=120; F=32.1, df=1, P<0.001)

SCIENTIFIC APPROACH

Is natural selection responsible for the morphological differences in *Anolis sagrei* between natural and disturbed habitat types?

Survivorship data obtained from a series of mark-recapture studies will be used to estimate the strength and form of selection potentially driving the morphological differences between *A. sagrei* in natural and disturbed habitats.

Additional work will focus on determining the heritability of any traits under selection using parent-offspring regression to gain a better understanding of the role of natural selection in driving the intraspecific morphological variation.

Lizards are injected with unique combinations of colored elastomer tags that are highly visible under UV light.

Are human-induced differences in habitat thermal characteristics driving the morphological differences in *Anolis sagrei*?

The thermal characteristics of natural and disturbed habitats have been assessed using physical lizard models. The locations of the models were randomly selected to best represent the variety of suitable lizard perch surfaces in each habitat type. The temperature of all models were recorded at 15 minute intervals throughout each of 15 days. Data at each site was generated simultaneously to eliminate the influence of variable weather.

The greater daily mean and variance of model temperatures in disturbed habitats supports the hypothesis that the morphological differences in *A. sagrei* between habitat types are potentially due to thermal differences. For example, *A. sagrei* could be larger in disturbed habitats than those in natural habitats because the greater availability of perching sites that allow lizards to maintain their preferred body temperature in disturbed areas could enhance growth.

	Mean Temperature	Mean Variance
Natural Habitat	31.2 °C (88.2 °F)	8.6 °C (47.5 °F)
Disturbed Habitat	34.5 °C (94.1 °F)	37.5 °C (99.5 °F)

Table 1 Differences in the mean and variance of model temperatures between disturbed and natural study sites (F=17.9, df=1, P<0.001; F=27.2, df=1, P<0.001)

Future work will include laboratory manipulations in which hatchlings will be raised under a variety of thermal conditions to gain a more complete understanding of the influence of habitat thermal characteristics on growth patterns and morphology.

IMPACTS

Escalating human disturbance underscores the importance of understanding the full spectrum of ways in which humans are impacting natural populations. Examining the evolutionary processes that produce and maintain biodiversity- the forces that actually lead to speciation and which allow species to respond adaptively to environmental change- is critical to conservation efforts.

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