Overheated lizards – Radiocápsula Ciencia Puerto Rico [1]

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The Puerto Rican lizard, "Anolis cristatellus", has two populations, one living in dry forests (Guánica, Aguirre, Boquerón and Ceiba) and one living in humid forests (Guajataca, Cambalache, La Vega and Mata de Plátano). Those living in dry forests are reaching their maximum temperature and could be a victim of climate change.

Abstract:

Rising global temperatures are predicted to impact organisms in diverse ways. For ectotherms, recent broad-scale analyses have predicted global patterns of vulnerability to warming, with tropical species at higher risk of detrimental effects than temperate species. However, vulnerability results from complex interactions between environment, physiology and behaviour. For species that inhabit a diversity of habitat types, these interactions may change across their range.

We measured operative thermal environments (Te) and body temperatures (Tb) of the tropical Caribbean lizard Anolis cristatellus at nine sites representing two habitat types: mesic and xeric

forest. The thermal sensitivity of whole-organism physiological performance (i.e. sprint speed) of one mesic and one xeric population was also measured. Thermal and performance data were integrated to determine how habitat thermal variation, behavioural thermoregulation and thermal physiology influence current physiological performance capacity in the field. We then evaluate if habitat suitability and physiological capacity would change assuming climate warming of 3 °C over the next century.

The mean Te of the xeric habitat was 4·5 °C warmer than that of the mesic habitat. However, behavioural thermoregulation by xeric lizards led to lesser differences in Tb (3·5 °C) between habitat types. The thermal sensitivity of sprint performance was similar for mesic and xeric lizards, and lizards from both habitats maintain sprint capacities near 100%. Climate warming is predicted to influence mesic and xeric lizards differently. Xeric lizards currently live in a thermal environment near their upper temperature threshold, while mesic lizards do not. As a result, the number of suitable perch sites is predicted to decrease dramatically in the xeric but not the mesic habitat. In addition, the physiological capacity of mesic lizards is predicted to increase by approximately 4%, whereas a decrease of approximately 30% is predicted for xeric lizards.

We characterized variation in the current biophysical and ecophysiological conditions experienced by A. cristatellus by integrating fine-scale measurements of thermal microhabitats with data on body temperatures and physiological performance capacities. These data allowed us to explicitly demonstrate how variation in these parameters can influence population susceptibility to climate warming across a species range and highlight the utility of a mechanistic approach in studies of global climate change.

Gunderson, A. R. and Leal, M. (2012), Geographic variation in vulnerability to climate warming in a tropical Caribbean lizard. Functional Ecology. doi: 10.1111/j.1365-2435.2012.01987.x

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