MICROHABITAT SELECTION OF *NOROPS* LIZARDS IN RELATION TO TEMPERATURE

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Abstract: Small lizards that employ a sit-and-wait foraging strategy tend to be thermal conformers whose body temperature corresponds to that of the environment. Given that the metabolism of thermal conformers depends on surrounding temperatures, we postulated that temperature is a major influencing factor on their microhabitat distributions. We studied the distribution of two thermal conforming lizard species, *Norops cupreus* and *Norops sericeus*, predicting that they would be most abundant in the warmest available microhabitats. This prediction was supported but we did not demonstrate that the distributions were different from random with respect to temperature.

Key words: foraging efficiency, temperature distributions, Norops cupreus, Norops sericeus, *thermal conformers*

INTRODUCTION

Lizards employ two kinds of foraging strategies: sit-and-wait, and active searching (Janzen 1983). A lizard's ability to maintain a particular body temperature through thermoregulation is affected by its foraging strategy. Active-searching predators often have body temperatures 4 - 10 °C higher than the surrounding temperature (Janzen 1983). Sit-and-wait predators, in contrast, spend most of their time perching and tend to be thermal conformers, which have body temperatures only 1 - 2 °C above surrounding temperature (Janzen 1983). Given the dependence of sit-and-wait strategists on the surrounding temperature to regulate their metabolism, we hypothesized that small lizards employing this foraging strategy would have habitat preferences based on local ambient temperature.

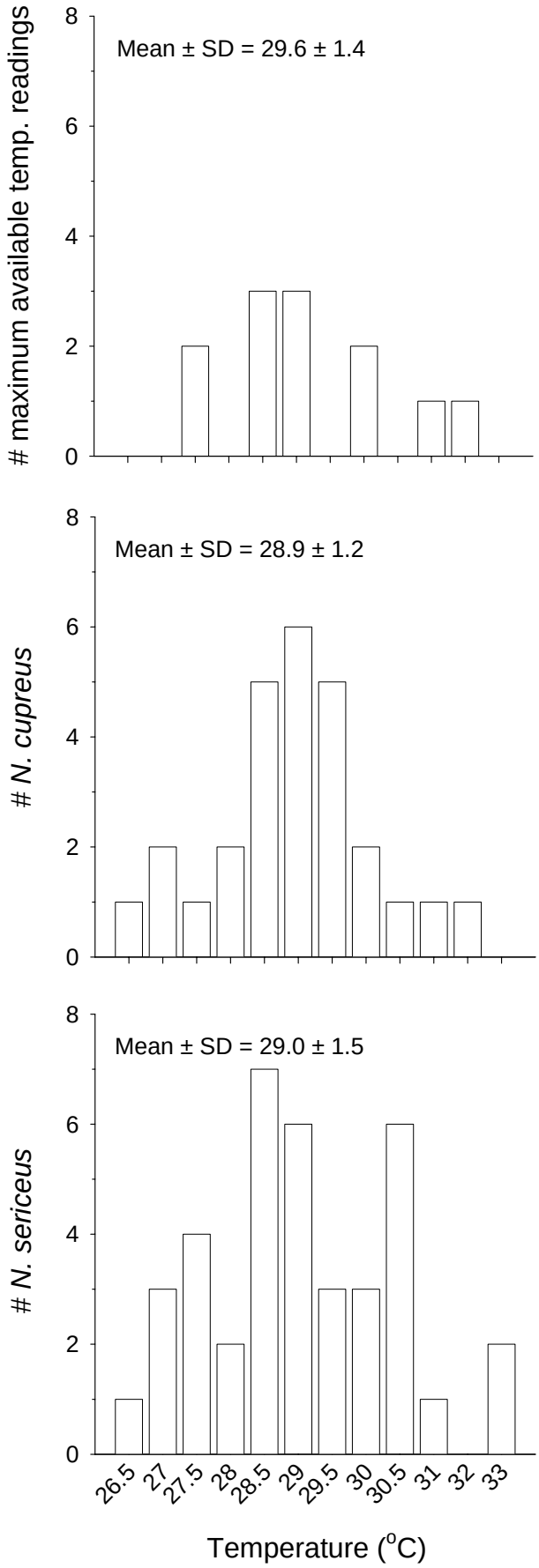
Two species of thermal conforming *Norops* lizards occur commonly in the tropical dry forest at Palo Verde. We predicted that *Norops* would be found in the warmest microhabitats available at a given time of day, where they would best be able to raise their metabolism and thus their activity level. We tested this prediction for two anole lizard species, *Norops cupreus* and *Norops sericeus*, which are both examples of thermal conforming, sit-and-wait predators that generally hunt invertebrates in leaf litter (Savage 2002).

METHODS

Throughout the day on 14 January 2004, we examined the distribution of *N. cupreus* and *N. sericeus* among microhabitats around the OTS field station at Palo Verde National Park, Costa Rica. We noted the time at which we first encountered each individual lizard, the temperature at that location (lizard location temperature), and the height above ground at which the lizard was initially observed. At 30 min intervals we estimated the maximum air temperature (maximum available temperature) within the area of recent lizard readings (ca 15 x 15 m) by measuring air temperatures within patches receiving direct sunlight. We used a one-way ANOVA to compare lizard location temperatures for the two species and maximum available temperatures. We also performed a visual evaluation of these three frequency distributions of temperatures to compare variance.

RESULTS

Mean lizard location temperatures did not differ from maximum available temperatures, nor did they differ between lizard species



($F_{2,77}$ = 0.61, P = 0.55). All three frequency distributions of temperatures appeared to be very similar in all respects (Fig. 1). Lizard height above ground did not differ significantly between species: mean ± SE = 23.4 ± 6.04 vs. 28.2 ± 6.79 cm for *N. sericeus* vs. *N. cupreus* (t = 0.53, df = 59, p = 0.60).

Discussion

Both *N. cupreus* and *N. sericeus* occurred in microhabitats that were as warm as the maximum available temperatures. Most of the lizards were found in a typical foraging position, perching on tree trunks less than 1 m above the ground (Janzen 1983). Presumably, lizards can maintain high metabolic activity, and therefore have high foraging efficiency, by positioning themselves in warm microhabitats.

One caveat to our conclusions is that we did not measure the temperatures of randomly selected microhabitats within these environments. Thus we do not know if lizard location temperatures or our estimates of "maximum available temperature," as measured just from sun patches, would have differed from randomly selected microhabitats. It may be that there was little difference in this forest between the average ambient temperature and maximum available microhabitat temperatures. In this case, we could have obtained the data in Fig. 1 even though lizards were positioning themselves at random with respect to microhabitat temperatures.

Future studies of the temperature distribution of lizards should use thermometers with rapid response times such as the BAT-12 telethermometer. With this, it would be possible to

Figure 1. Frequency distributions of maximum available temperatures (upper) and local lizard temperatures for *N. cupreus* (middle) and *N. sericeus* (bottom). The means and the variances were very similar among distributions.

measure the shaded air temperature as well as the temperature of an inert black body (e.g. a 2 x 2 cm of black foam rubber) to estimate solar warming potential. This would be the best way quantify the energy available to lizards in different microhabitats, and correlate it to their habitat preferences.

It is interesting to note the similarity in microhabitat preferences between the two species given that they are highly territorial (Savage 2002). Field observations indicated that more *N. sericeus* were active at dusk, suggesting that the two species partition the habitat temporally. Future studies could compare the temporal activity patterns of the two species, and determine how niche differentiation occurs.

LITERATURE CITED

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