ISSN 1094-2246

Contemporary Herpetology

Volume 2009, Number 1 19 March 2009 contemporaryherpetology.org

EFFECTS OF CHIGGER MITE (ACARI: TROMBICULIDAE) INFECTIONS ON *AMEIVA* (SQUAMATA: TEIIDAE) FROM THE ANGUILLA BANK

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ABSTRACT: We examined 152 *Ameiva plei* from four sites on Anguilla and from Scrub Island, a nearby satellite, and 12 *A. corax* from Little Scrub Island, another Anguillian satellite, generated indices of condition by dividing mass (g) by SVL (mm), and quantified degrees of eutrombiculid chigger mite infections by measuring the total areas (mm^2) of each lizard covered by one or more clusters of mites. Prevalence in infected *A. plei* (N = 77) varied significantly by site, but frequencies of infected males and females within sites did not differ significantly. Indices of condition of infected and mite-free lizards did not differ significantly, nor was area covered by mites significantly correlated with condition, suggesting that mite infections are relatively asymptomatic. All *Ameiva corax* were infected, and area covered by mites was not significantly correlated with condition. Indices of condition for *A. corax* were significantly lower than for infected *A. plei*, probably reflecting the poorer condition of lizards occupying a food-deficient habitat.

Key Words: Acari; *Ameiva corax*; *Ameiva plei*; Anguilla Bank; Chigger mites; Eutrombiculidae; West Indies

INTRODUCTION

Trombiculid chigger mites are common ectoparasites of West Indian reptiles (e.g., Schwartz and Henderson 1991, Zippel et al. 1996). However, no studies of West Indian *Ameiva* have attempted to relate the extent of infections to the condition of individual lizards. Two species of *Ameiva* are endemic to the Anguilla Bank. *Ameiva plei* (Figure 1) is widely distributed on the Bank, whereas *A. corax* (Figure 2), one of three melanistic species in the Lesser Antilles, is found only on the Anguillian satellite, Little Scrub Island (Censky and Paulson 1992). The former is larger, maximum male snout-vent length (SVL) to 181 mm, versus 132 mm in *A. corax* (Censky and Paulson 1992). Most populations of *A. plei* exhibit distinct sexual size dimorphism (SSD; Censky 1996). Although SSD indices, based on maximum known sizes for males and females, differ little (*A. plei*, 1.30:1, Censky 1998; *A. corax*, 1.31:1, White et al. 2002), adult male *A. plei* are considerably more robust than females or *A. corax* of either sex.

METHODS

In June 2000, we examined 152 *Ameiva plei* from four sites on Anguilla and from Scrub Island, a nearby satellite, and 12 *A. corax* from Little Scrub Island, another Anguillian satellite (Figure 3). Most lizards were released at the site of capture; specimens kept were deposited in the Bobby Witcher Memorial Collection (BWMC, Avila University, Kansas City, Missouri). We generated an index of condition by dividing mass (g) by SVL (mm) and quantified degrees of mite infection by measuring the total areas (mm^2) of each lizard that were covered by one or more clusters of mites. To correct for the possibility that equal quantities of mites might exert a greater impact on smaller lizards, we divided the area covered by mites by SVL. All means are presented ± 1 SE, and for all statistical tests, $\alpha = 0.05$.

RESULTS AND DISCUSSION

Infected *Ameiva plei* (N = 77) ranged considerably in size (89.7 ± 2.9 mm, 38–144 mm) and both sexes were represented (M:F, 59:18). Prevalence (Table I) varied significantly by site (Friedman test, df = 4, $\chi^2 = 0$, P = 1.00). Habitats at the two sites with very low frequencies of infection did not differ in any obvious way from those at high-prevalence sites. Zippel et al. (1996) related frequencies of mite infections in *Anolis* lizards with more mesic habitats, but in this study, all sites were

Figure 1. *Ameiva plei* is widely distributed on the Anguilla Bank.

Table I. Prevalence of eutrombiculid chigger mite infections in *Ameiva* from the Anguilla Bank. Localities are shown in Figure 3. Sex ratios of hosts given for entire sample and for infected lizards (in parentheses).

Species and Site	Prevalence (N)	Sex Ratio (M:F)
Ameiva plei		
Cavanah Cave	83.8 % (37)	31:6 (26:5)
Katouche Bay	9.1 % (11)	9:1 (1:0) *
Junk's Hole	72.0 % (25)	20:5 (15:3)
Cinnamon Reef	14.8 % (54)	46:7 (1:6) *
Scrub Island	80.0 % (25)	17:8 (12:8)
Ameiva corax		
Little Scrub Island	100.0 % (12)	9:3 (9:3)

* one individual of undetermined sex

xeric. One site (Cinnamon Reef) was in a resort area, where decorative landscaping involved some localized watering, but prevalence at this site was very low.

Frequencies of infection of males and females within sites did not differ significantly (Contingency tests, df = 1, all P ≥ 0.68), indicating that males and females are equally vulnerable to infection. Area covered by mites was not correlated with SVL (Spearman Rank Correlation, Z = 0.47, P = 0.63). Indices of condition of infected (0.36 ± 0.04) and mite-free (0.43 ± 0.04) males were significantly higher than those of infected (0.19 ± 0.01) and mite-free females (0.24 ± 0.02; Mann Whitney U, Z = -3.22, P = 0.001; Z = 3.33, P = 0.0009; respectively). We doubt that these differences reflect sexual variation in condition; instead they are probably indicative of sexual dimorphism in body proportions, with the higher values for males reflecting a more robust habitus. However, indices of condition of infected (0.37 ± 0.03) and mite-free males (0.43 ± 0.04), infected (0.19 ± 0.01) and mite-free females (0.24 ± 0.02), and all infected (0.33 ± 0.03) and mite-free *Ameiva plei* (0.38 ± 0.03) did not differ significantly (Z = -1.71, P = 0.09; Z = -1.62, P = 0.11; and Z = -1.70, P = 0.09; respectively). Also, area covered by mites (13.6 ± 1.9 mm^2, 0.79–120.2 mm^2) was not significantly correlated with condition (Z = 0.82, P = 0.41), even when areas were corrected for SVL (Z = 0.82, P = 0.41). This lack of significant differences suggests that mite infections are relatively asymptomatic.

All of the *Ameiva corax* sampled (N = 12) were infected, three were females, and all were adults or subadults (95.5 ± 3.4 mm, 73–111 mm). Area covered by mites was not correlated with SVL (Spearman Rank Correlation, Z = 0.84, P = 0.40), nor was the area covered by mites (8.6 ± 2.2 mm^2, 0.79–24.3 mm^2) significantly correlated with condition (Z = -0.62, P = 0.53), even when areas were corrected for SVL (Z = -0.46, P = 0.64). Unlike for *A. plei*, indices of condition of males (0.28 ± 0.01) and females (0.23 ± 0.02) did not differ significantly (Mann Whitney U, Z = -1.76, P = 0.08), possibly reflecting less sexual dimorphism in body proportions in this species. Indices of condition for all *A. corax* (0.26 ± 0.01) were significantly lower than for infected *A. plei* (Mann Whitney U, Z = -0.49, P = 0.63), but this may merely reflect the poorer condition of lizards occupying a habitat with food only seasonally abundant (Censky and Powell 2001).

Consistently higher, albeit statistically insignificant differences in the indices of condition for mite-free lizards suggest that mite infections have some impact on affected hosts. However, selection over a long association of obligate parasites with their hosts, such as that suggested for *Eutrombicula alfreddugesi* and Hispaniolan anoles (Zippel et al. 1996), would serve to mediate any negative impact. Such a long-term relationship between Anguilla Bank *Ameiva* and these mites may have consequently rendered these infections essentially asymptomatic, at least in *A. plei*. Our small sample of *A. corax* included no mite-free individuals, which precluded comparisons of infected and non-infected animals.

ACKNOWLEDGMENTS

We thank The Rev. John A. Gumbs, Albert A. R. Lake, Evan Lake, Rose-el Ellen R'dson, and Olive Hodge for graciously granting us permission to collect animals on their properties. Justin J. Shew, John S. Parmerlee, Jr.,

Figure 2. The distribution of melanistic *Ameiva corax* is restricted to Little Scrub Island near Anguilla (Figure 3).

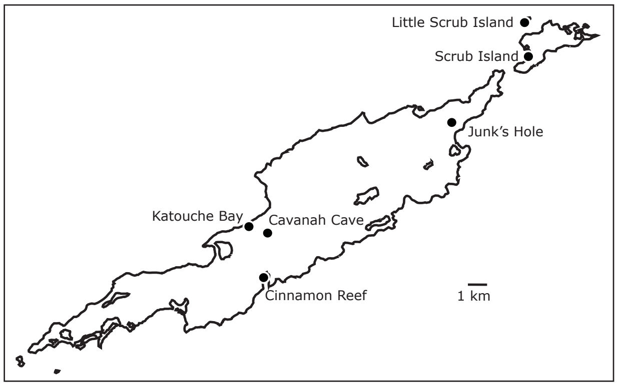

Figure 3. Map of Anguilla and nearby satellites showing locations of study sites.

and Robert W. Henderson helped in the field. Karim V. D. Hodge, Anguilla National Trust, and David Carty provided logistical help with permits and housing. Research was supported by National Science Foundation Grant No. DBI-9732257 to RP.

LITERATURE CITED

CENSKY, E. J. 1996. The evolution of sexual size dimorphism in the teiid lizard *Ameiva plei*: A test of alternative hypotheses. Pp. 277–289 in R. Powell and R. W. Henderson (eds.), Contributions to West Indian Herpetology: A Tribute to Albert Schwartz. Contributions to Herpetology, Volume 12. Society for the Study of Amphibians and Reptiles, Ithaca, New York.

CENSKY, E. J. 1998. *Ameiva plei*. Catalogue of American Amphibians and Reptiles (671):1–3.

CENSKY, E. J. and D. R. PAULSON. 1992. Revision of the *Ameiva* (Reptilia: Teiidae) of the Anguilla Bank, West Indies. Annals of the Carnegie Museum 61:177–195.

CENSKY, E.J. and R. POWELL. 2001. Little black dragons of Little Scrub Island. Fauna 2(3):24–31.

SCHWARTZ, A. and R. W. HENDERSON. 1991. Amphibians and Reptiles of the West Indies: Descriptions, Distributions, and Natural History. University of Florida Press, Gainesville, Florida.

WHITE, A. M., E. J. CENSKY, and R. POWELL. 2002. *Ameiva corax*. Catalogue of American Amphibians and Reptiles (746):1–2.

ZIPPEL, K. C., R. POWELL, J. S. PARMERLEE, Jr., S. MONKS, A. LATHROP, and D. D. SMITH. 1996. The distribution of larval *Eutrombicula alfreddugesi* (Acari: Trombiculidae) infesting *Anolis* lizards (Lacertilia: Polychrotidae) from different habitats on Hispaniola. Caribbean Journal of Science 32:43–49.