

Habitat distribution of mites (Acari) on
Anolis oculatus and *Anolis cristatellus*
(Squamata: Polychrotidae) in the
Commonwealth of Dominica

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Texas A&M University Dominica Study Abroad 2015

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ABSTRACT

Anolis cristatellus Duméril and Bibron (Squamata: Polychrotidae) is an invasive lizard species to the Commonwealth of Dominica, and has been displacing the indigenous *Anolis oculatus* Cope (Squamata: Polychrotidae) from its habitat. The occurrence of parasitic mites (Acari) on both *Anolis* spp. were compared in various habitats on the island: primary rainforest, secondary rainforest, mature dry secondary forest, urban, and beach. Anoles were hand-caught, and mites were removed using forceps before being slide-mounted. Ten *A. oculatus* were found in primary rainforest, seven in secondary rainforest, and three in secondary dry forest. *Anolis cristatellus* was more common in urbanized areas, as six were found in urban areas, ten in secondary dry forest, one on a beach, and one on a building in primary rainforest. Mites were only found on *A. oculatus* in primary rainforest. *Anolis oculatus* in other habitats were free of mites. No *A. cristatellus* were infested with mites, regardless of habitat.

INTRODUCTION

Dominica, a small island in the West Indies, is occupied by two species of anoles; *Anolis oculatus* Cope (Squamata: Polychrotidae), the Dominican anole, is the native species on the island,

and *Anolis cristatellus* Duméril and Bibron (Squamata: Polychrotidae), the Puerto Rican crested anole, is an invasive species to Dominica. Although *A. oculatus* was once the only species of anole on the island, it has been forced from its habitat in urban areas by the aggressive *A. cristatellus* since its invasion near Canefield between 1997 and 2002 (Malhotra, Roger, Hypolite, and James 2007). *Anolis cristatellus* has spread since the initial discovery of its presence on Dominica and now occupies much of the southwest area of the island, along with a significant presence in Cabrits National Park. Because *A. cristatellus* is very resilient and competitive with *A. oculatus*, it will likely spread from its current territory in coming years.

Invasive species can wreak havoc on an ecosystem by not only preying on or displacing indigenous species, but also by carrying invasive diseases or parasites in with them. Mites are a parasite often transported by their hosts to new regions. While some mites are opportunistic parasites, many prefer a single species of host or a specific habitat (Fajfer 2012). Because there are two species of *Anolis* on the island and they are found in a wide variety of habitats, the occurrence and species of mites may differ between *Anolis* species and habitat.

MATERIALS AND METHODS

Both species of anoles found on Dominica, *A. oculatus* and *A. cristatellus*, were collected from various locations on the island, representative of different habitats; Springfield Estate and Syndicate Trail in Morne Diablotin National Park are areas of secondary rainforest, Emerald Pool in Morne Trois Pitons National Park is primary rainforest, Cabrits National Park is mature secondary dry forest, the Botanical Gardens in Roseau are urban, and St. David's Bay is a coastal habitat with a sandy beach. Collection occurred between May 30, 2015, and June 11, 2015. Each

anole was examined for mites, which were spotted as small red to yellow specks usually around the head, on the dewlap, in the axillary space behind the forelimbs, or in the groin area behind the hindlimbs. Mites were carefully removed by firmly pulling them from the anole's skin using curved fine-tip forceps and were placed in a vial of 95% ethanol. Each vial was marked with the date of collection, the location where the anole was found, and the species of anole the mites were taken from. The vials were stored in the lab until the mites could be slide-mounted.

Each vial was poured into a watch glass and examined under a dissecting microscope. Mites were sorted into morphotypes as applicable. High quality mites of each morphotype were placed in Nesbitt's solution and allowed to sit for 30 minutes to clear. Two drops of Hoyer's solution were placed on a slide, and the cleared mites were removed from Nesbitt's and placed into Hoyer's using fine-tip forceps. A slide cover was placed over the mites in Hoyer's and the mounted mites were left to sit for several days until they set.

RESULTS

A total of 23 *A. oculatus* were captured, 12 of which were infested with mites, and 18 *A. cristatellus* were captured, none of which were mite-infested. All results are listed in **Table 1**. Collections occurred at Emerald Pool on three separate occasions, and 11 *A. oculatus* were found along with a single *A. cristatellus* at the Visitor Center. All but one *A. oculatus* were infested by mites, and the *A. cristatellus* was not infested. All seven anoles caught at or around Springfield Estate were *A. oculatus*, and none of them showed signs of mites. Cabrits National Park is an area of dry forest near the coast, and 10 *A. cristatellus* were found along with three *A. oculatus*. Every anole caught at Cabrits, regardless of species, was free of mites. On Syndicate Trail, two *A.*

oculatus were caught, and both were infested with mites. The Botanical Gardens of Roseau were overrun with *A. cristatellus*, and six were caught, all of which were clear of mites. No *A. oculatus* were spotted. At St. David's Bay, one *A. cristatellus* was caught on the beach near the water, and it was free of mites. No *A. cristatellus* were infested with mites at any location, and only *A. oculatus* in primary forest were infested with mites.

Table 1. Locality and habitat of *Anolis* spp. and occurrence of mite infestation.

Date	Species	Location	Habitat	Mites
5/30/2015	<i>Anolis oculatus</i>	Springfield Estate (Checkhall River)	secondary rainforest	not infested
5/30/2015	<i>Anolis oculatus</i>	Springfield Estate (Checkhall River)	secondary rainforest	not infested
5/30/2015	<i>Anolis oculatus</i>	Springfield Estate (Checkhall River)	secondary rainforest	not infested
5/30/2015	<i>Anolis oculatus</i>	Springfield Estate (Checkhall River)	secondary rainforest	not infested
6/1/2015	<i>Anolis oculatus</i>	Springfield Estate (Beehouse)	secondary rainforest	not infested
6/1/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/1/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/1/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/1/2015	<i>Anolis oculatus</i>	Springfield Estate (Guesthouse)	secondary rainforest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested

6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis oculatus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis oculatus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis oculatus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis cristatellus</i>	Cabrits Natl. Park	mature secondary dry forest	not infested
6/2/2015	<i>Anolis oculatus</i>	Syndicate Trail in Morne Diablotin Natl. Park	primary rainforest	infested
6/2/2015	<i>Anolis oculatus</i>	Syndicate Trail in Morne Diablotin Natl. Park	primary rainforest	infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/3/2015	<i>Anolis cristatellus</i>	Botanical Gardens in Roseau	urban	not infested
6/4/2015	<i>Anolis oculatus</i>	Springfield Estate (Guesthouse)	secondary rainforest	not infested
6/5/2015	<i>Anolis cristatellus</i>	St. David's Bay	beach	not infested
6/5/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/5/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/5/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/11/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested

6/11/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/11/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	not infested
6/11/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/11/2015	<i>Anolis oculatus</i>	Emerald Pool in Morne Trois Pitons Natl. Park	primary rainforest	infested
6/11/2015	<i>Anolis cristatellus</i>	Emerald Pool in Morne Trois Pitons Natl. Park (Visitor Center)	primary rainforest	not infested

Figure 1 shows the number of *A. cristatellus* and *A. oculatus* found in different habitats on the island. In dry, urban, or coastal areas, 17 *A. cristatellus* were captured, and only three *A. oculatus* were found at Cabrits in the mature secondary dry forest. Though not recorded in the table, more *A. cristatellus* were found near the beach at Cabrits, while more *A. oculatus* were found up the trail at higher elevations and denser forest. In both primary and secondary rainforest, *A. oculatus* was the only anole found, with a total of 20 captured, except for a single *A. cristatellus* at the Visitor Center to Emerald Pool.

Each lizard was checked thoroughly for mites. **Figure 2** shows that mites were only found in one type of habitat—primary rainforest. All anoles, regardless of species, were free of mites in the other four habitats sampled. Nine *A. oculatus* in primary rainforest were infested with mites.

Figure 3 shows both which *Anolis* spp. were infested with mites and which habitats mite-infested anoles were found in. Mites were only found on *A. oculatus* and were only found in primary rainforest. All *A. cristatellus* were free of mites, regardless of habitat.

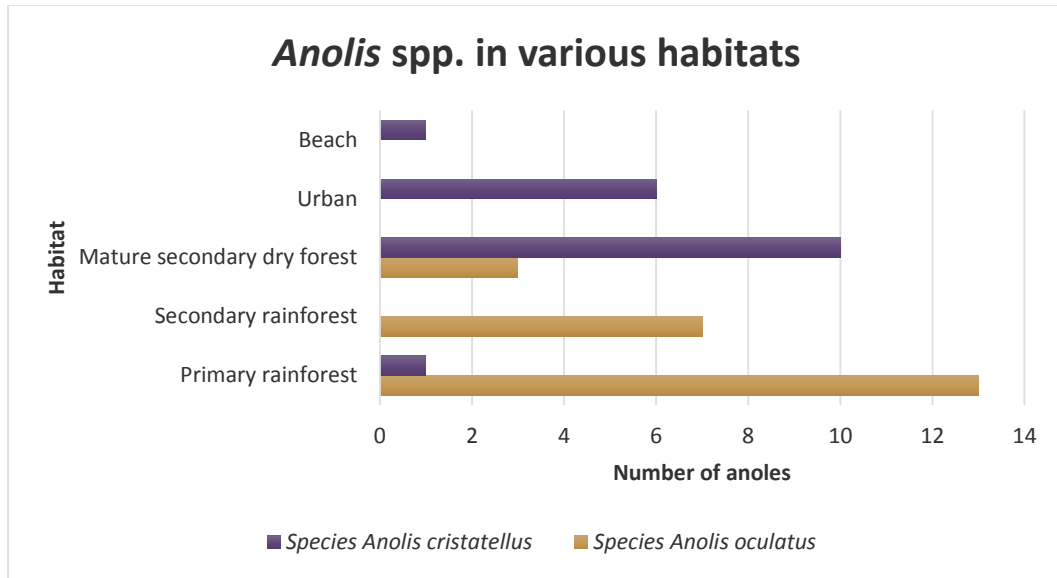


Figure 1. *Anolis* spp. in various habitats. Coastal, urban, and dry areas were mostly occupied by *Anolis cristatellus*. In primary and secondary rainforest, *Anolis oculatus* was the primary species captured.

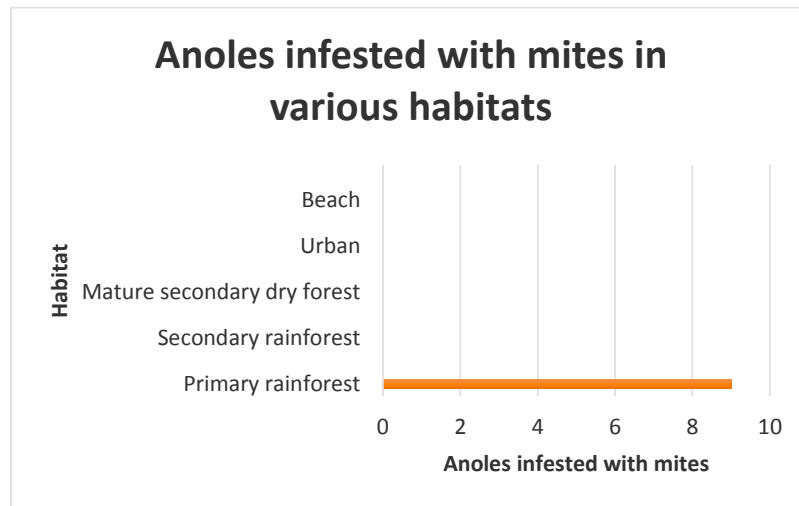


Figure 2. Anoles infested with mites in various habitats. All infested anoles were found in primary rainforest.

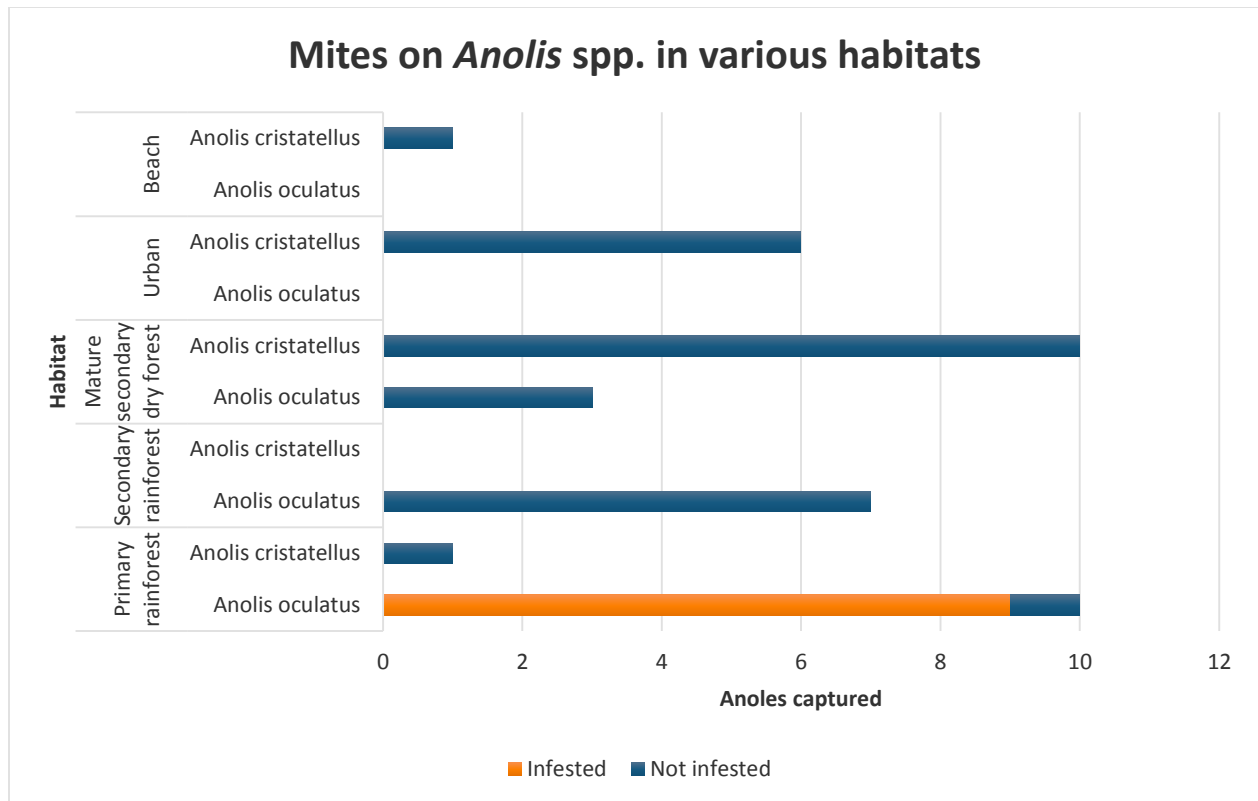


Figure 3. Mites on *Anolis* spp. in various habitats. Mites were found only on *A. oculatus* only in primary rainforest. All *A. cristatellus* were free of mites, and all *A. oculatus* in habitats other than primary rainforest were clear of mites.

DISCUSSION

Because no mites were found on *A. cristatellus*, the anole may have not brought in any invasive mite species. While the anole is still a serious problem on the island, the lack of mites may reduce the impact a mite-carrying anole could have had on the ecosystem.

There is not a definite explanation as to why the mites on Dominica do not seem to infest *A. cristatellus*. The Puerto Rican anole's resistance to the mites that infest the Dominican anole may be related to its high adaptability.

On the anoles collected, mites were only found on the anoles in primary rainforest. This is another possible explanation for the lack of mites on *A. cristatellus*. *Anolis cristatellus* seems to prefer open, dry areas, as it is rarely spotted in dense rainforest. In this study, only one *A. cristatellus* was found in primary rainforest, but it was on a building (Emerald Pool Visitor Center). If the mites prefer primary rainforest, the anole may not have been exposed to them.

Because collection occurred only over a short three-week period, many of the habitats were under-represented. Several locations were only visited once, so collection of anoles was limited. More samples are needed to fully support that mites do not infest *A. cristatellus* and to determine if mites are only found in primary rainforest. In a previous study, mites were found on *A. oculatus* collected at Springfield Estate, which is secondary rainforest (Manago 2006). Further studies should collect more anoles from secondary rainforest to determine how frequently mites infest anoles in this habitat. More samples should also be collected from coastal and beach areas, such as St. David's Bay. Future studies should collect anoles from elfin forest as well as the other habitats listed, since none were collected during this study.

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