A Preliminary Survey for Spiders on Dominica, W.I.

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ABSTRACT
A survey of spiders was conducted on Dominica, West Indies, over a five-week period from July-August 2014. Thirteen habitats from 17 localities were surveyed, including five man-made habitats. Nineteen families representing 90 species were collected. Members of the families Araneidae, Salticidae and Theridiidae comprised over half of the species found.

Keywords: Araneidae, Lesser Antilles, Salticidae, Theridiidae

INTRODUCTION

Arthropods comprise the most diverse organisms in any terrestrial environment. Sampling arthropods is particularly challenging due to their size, short generation time, diversity, limited distribution and strict environmental requirements (microhabitats). However, these traits make it theoretically possible to use arthropods for more fine-scale studies, such as mapping environmental diversity or tracking environmental changes; thus, they are preferred for certain studies over longer-lived and more habitat-flexible organisms like vertebrates and plants for such studies.

Spiders have a worldwide distribution, occupying all terrestrial environments except the polar extremes. Currently 48,299 species of spiders are described worldwide (World Spider Catalog 2019), representing what is believed to be roughly one-fifth of the true total. The spider fauna of the Neotropics remains relatively unknown. Within the Lesser Antilles of the Caribbean, the spider fauna has been preliminarily documented at the species level for Barbados (G. Alayón and J. Horrocks 2004), St. Vincent & the Grenadines (Simon 1894; de Silva *et al.* 2006), Anguilla (Sewlal and Starr 2010), Antigua (Sewlal 2009a), Nevis (Sewlal and Starr 2007), St. Kitts (Sewlal 2008), Grenada (Sewlal 2009b), Montserrat (Sewlal 2010a), St Lucia (Sewlal 2011), Great Inagua, Bahamas (Sewlal and Starr 2011) and St. Eustatius (Mopeth *et al.* 2016) .

The overall goal of the survey was to collect and document a substantial part the species present in a broad range of habitats, both natural and those influenced by human activities. This paper forms part of a series of papers documenting the spider fauna of islands in the Caribbean.

METHODS

I spent five weeks (14 June to 21 July 2014) of the early rainy season on the island of Dominica as an entomologist for Operation Wallacea (Opwall), a conservation research organization. Part of my assignment was to conduct a survey of the island's spider fauna with the aim of collecting a substantial part of the fauna in a broad variety of habitats. Dominica is one of the southern Lesser Antilles at (15°25′N 61°20′W) with an area of 751km^2. It is volcanic in origin with its highest elevation being approximately 1,447m. There are a range of habitats found on the island, including fumarole vegetation, elfin woodland, montane forest, deciduous forest and lowland rainforest. The selection of habitats and localities were based on consultations and habitat descriptions from the staff at the Archbold Research Centre, Springfield Estate and the Forestry Division of the Ministry of Environment, Climate Resilience, Disaster Management and Urban Renewal, Dominica.

Three collecting methods were employed during this survey; sweep-netting and visual searches were conducted at all sites and pit-fall traps were used at one site. Sweep-netting consisted of sweeping understory vegetation and low-hanging branches with a heavy canvas insect net, 30.5 cm in diameter. Any individuals resting or hiding in the vegetation are dislodged into the net. After 15 to 20 sweeps, the net was examined and any spiders transferred to vials containing 95% alcohol within the confines of the net to prevent escape of specimens. Visual search involved walking around and collecting spiders by hand. The surface of plants, tree stems and logs were searched, as well as finding webs and subsequently the spiders' retreat.

Pitfall traps were only used at the Beehouse Trail near the Archbold Research Centre, Springfield Estate. Each pitfall trap consisted of a plastic cup approximately 11cm deep placed in the soil so that the lip of the cup was level with the ground. It was two-thirds filled with a super-saturated salt solution and a few drops of dish washing liquid to break the surface tension of the water so the spiders sank to the bottom. This method targeted ground-dwelling spiders.

Table 1 Spiders collected for each habitat sampled in Dominica, W.I. during the period 14 June to 21 July 2014.

Family and Species	Habitat	Secondary vegetation	Garden	Riparian Vegetation	Coastal vegetation	Fumarole vegetation	Elfin woodland	Roadside	Ruins	Montane	Deciduous forest	In & around buildings	Lowland rainforest	Rainforest
Araneidae	14 spp. not ID	abcdefgil	achjm										k	
	Acacesia sp.		✓											
	Cf *Alpaida* sp.	✓	✓						✓					
	Argiope argentata	✓	✓	✓	✓	✓							✓	
	Cyclosa caroli	✓	✓							✓		✓	✓	
	Eustala anastera	✓	✓							✓				
	Eustala fuscovittata		✓											
	cancriformis	✓								✓				
	Cf *Hypognatha* sp.	✓								✓				
	Larinia sp.		✓											
	Metepeira compsa	✓	✓											
	Micrathena sp.	✓	✓	✓										
	Neoscona sp.	✓												
	Spilasma sp.	✓								✓				✓
	Cf. *Wagneriana* sp.	✓												
	Cf *Xylethrus* sp.	✓												
Agelenidae	1 sp. not ID	✓												
Coriniidae	2 spp. not ID	a	b											
Linyphiidae	1 sp. not ID		✓			✓								
Lycosidae	1 sp. not ID	✓	✓	✓										
Mimetidae	1 sp. not ID		✓											
Miturgidae	2 spp. not ID	ab	a		a			a			a	a		a
	Cheircanthium sp.	✓												
Oecobidae	1 sp. not ID								✓					
Oxyopidae	1 sp. not ID	✓												
Pholcidae	4 spp. not ID	abc	a	a		d	c	a		ac			ac	d
	Physocyclus globosus											✓		
Salticidae	9 spp. Not-ID	abcdefg	afhl			h		a		c		d	a	
	Hentzia sp.	✓												
	Lyssomanes sp.	✓												
Scytodidae	*Scytodes fusca*					✓						✓		
	Scytodes longipes		✓									✓		
Sicariidae	1sp. not ID													
Sparassidae	"*Olios* " sp.	✓	✓		✓									✓
Tetragnathidae	1 sp. not-ID	✓	✓											
	Aleimosphenus licinus	✓	✓											
	Leucauge argyra	✓	✓	✓	✓	✓	✓				✓		✓	✓
	Leucauge regyni	✓	✓							✓		✓		
	Leucauge 2 spp.								b	a				
	Cf *Opas* sp.												✓	
	Tetragnatha s p.	✓	✓	✓										
Theridiidae	9 spp. not-ID	abcefhi	cf			f						d	c	
	Argyrodes elevatus	✓			✓									
	Latrodectus geometricus		✓									✓		
	Theridon 2 spp.	a	a			a						b		
	1 sp. not ID	✓	✓							✓		✓		
Thomisidae	6 spp. not ID	abcdef	b			f				d				
	Misumenops sp.		✓											
Uloboridae	1 sp. not ID	✓								✓				
TOTAL		65	38	6	5	10	3	3	3	15	4	11	10	6

After collection, specimens were identified to species level under a microscope using identification keys. All specimens are stored in 95% ethanol with their identification and locality labels, and a selection of specimens were deposited in the Archbold Research Centre, Springfield Estate, Dominica, to assist researchers of future general ecological surveys.

RESULTS AND DISCUSSION

Seventeen localities covering 13 habitats were sampled, including five habitats that were man-made or heavily influenced by human activities. The sampling produced a total of 90 species from 19 families. Secondary vegetation and garden habitats were the most species-rich, producing the highest and second highest number of different species (Table 1), while one natural habitat (elfin woodland) and two human-made habitats (roadside and ruins) showed the lowest species richness, yielding only three species each. The families Araneidae, Theridiidae and Salticidae were the best-represented, yielding 29, 11 and 13 species respectively. Araneidae and Tetragnathidae were the two most ecologically diverse families containing species collected from 11 and 12 habitats, respectively. Forty-six species from 14 families were found in a single habitat only. It must be noted that the sampling effort was not standardised so any comparisons of species richness between habitats/ locations must be made with caution.

Dominica has earned the nickname, "the nature isle of the Caribbean". This is because Dominica has capitalized on its biodiversity in terms of ecotourism, thereby preserving the habitats present including both natural habitats and those influenced by human activities, like secondary forest and gardens. This preservation, along with the extended sampling period, may account for the greater number of spider species documented in Dominica compared to other islands in the Eastern Caribbean that have been sampled.

Of islands surveyed for spiders in the Eastern Caribbean, the ones with greater species richness in natural habitats are: Grenada (Sewlal 2009b), Monserrat (Sewlal 2010a) and Antigua (Sewlal 2009a), while the islands that showed greater species richness in human-made habitats are: Nevis (Sewlal & Starr 2007), St Kitts (Sewlal 2008) and St Lucia (Sewlal 2011)The results here are congruent with the former scenario.

In habitats with higher species richness, secondary vegetation contained the highest number of species, with 65 species from 15 families (Table 1). This is expected as the disturbance may create conditions ideal for both generalist and specialist species, thus increasing species richness. Some habitats also provide a natural path or gap in the vegetation where prey, in particular flying insects, can be more easily caught in the webs. Another feature of most altered habitats is the presence of artificial lighting during the night which attracts flying insects, so that nocturnal species have a more or less steady food supply. This could account for the second highest species richness of the garden habitat.

The three habitats yielding the fewest species (three each) were ruins, roadside vegetation and elfin woodland. The presence of the family Oecobiidae in the ruins habitat is expected, as this family is commonly found on ruins on other islands (personal observation). A low species richness was also expected for elfin woodland due to the extreme conditions present in this habitat type in terms of microclimate. However, a low species richness for roadside vegetation was unusual because no members of the family Araneidae were collected from this habitat type. Ward (2007) reported *Argiope argentata* from roadside vegetation, which is consistent with observations from other islands in the Eastern Caribbean (Sewlal and Starr 2007; 2010, Sewlal 2008; 2009a; 2009b; 2010a; 2011). However, since little time was devoted to collecting in this habitat, a low species richness was expected.

It was notable that no specimens of the Mygalomorphae group were collected during this survey. I had expected to find at least occasional small tarantulas under logs or rocks. The only species of known medical importance for humans was *Latrodectus geometricus* (Theridiidae), commonly called the Brown Widow.

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