ORIGINAL ARTICLE

Preliminary Survey of the Spider Fauna on Great Inagua, Bahamas, West Indies

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ABSTRACT

A preliminary survey of the spider fauna of Great Inagua Island, Bahamas was conducted between December 2010 and January 2011. Six habitats in five localities were surveyed including three altered and three natural. Sampling efforts produced roughly equal species richness in both natural habitats (12 species) and those that were man-made or altered by human activity (13 species). Twenty-five species representing 10 families were collected; members of the families Araneidae (eight species) and Tetragnathidae (two species) comprised almost half of the species found.

INTRODUCTION

Arthropods comprise the most diverse organisms in any terrestrial environment. However, biological surveys tend to favour the collection of vertebrates and plant species (Scharff, Coddington, Griswold, Horminga, & Bjørn., 2003). Hence information on diverse groups, such as spiders (Araneae) is lacking (Longino, 1994). Currently, a little over 42,000 species of spiders are described (Platnick, 2011), representing what is believed to be roughly one-fifth of the total number of spider species in the world. Thus it can be seen that the global spider fauna is still far from being completely known. This situation is especially true of the spider fauna of the neotropics especially the West Indies.

Currently, the spider fauna of most of the islands in the Eastern Caribbean has been documented at the species level: Barbados (Alayón & Horrocks, 2004), St. Vincent and the Grenadines (Simon, 1894; de Silva, Horrocks, & Alayón, 2006), Anguilla (Sewlal & Starr, in press), Antigua (Sewlal, 2009a), Nevis (Sewlal & Starr, 2007), St. Kitts (Sewlal, 2008), Grenada (Sewlal, 2009b), Montserrat (Sewlal, 2010a) and St. Lucia (Sewlal, 2011). But, at the family level the spider fauna is recorded for Trinidad (Cutler, 2005; Sewlal & Cutler, 2003; Sewlal & Alayón, 2007; Sewlal, 2009c, 2010b).

Thirty-two species of spiders are documented from the Bahama Islands (Platnick, 2008; Schoener & Spiller, 2006) most of which are

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orb-weaving spider species; however, a detailed survey for a single Bahamian island inclusive of spiders of other ecological guilds like ground runners, vegetation runners and ambushers does not exist.

A 10-day preliminary survey of the spider fauna was conducted on Great Inagua, Bahamas from December 29, 2010 to January 7, 2011.

METHODS

Six localities in six habitats were selected throughout the island; three were man-made or influenced by human activity and the other three were natural. Multiple localities of these habitats were sampled where time and accessibility permitted (Table 1).

Table 1. Description of habitats and localities sampled in Great Inagua, Bahamas from December 2010 to January 2011

Habitat	Description	Localities sampled
Garden	Lands landscaped and maintained at private residences, hotels or for public viewing.	Mathew Town
Roadside	Vegetation up to 30m from either side of the road	Mathew Town
Inside and around dwellings	Inside and around buildings occupied by humans	Mathew Town
Coastal Vegetation	Vegetation comprises mainly sea grapes (*Coccoloba uvifera*). Most vegetation is stunted and wind-sculpted where wind exposure is high. Often, conifers are found growing along the coastline.	Conch Shell Point, Devil's Point, on ridge about 2 km from Conch Shell Point.
Mangrove	Mangrove and vegetation under its canopy found along the banks of rivers or lakes or in dry coastal areas.	On the way to East Point
Dwarf Forest	The vegetation is typical of a tropical forest but is stunted by high winds.	Conch Shell Point

Three methods of collecting were employed: visual search, sweep-netting and the use of pitfall traps. These methods were chosen as they are most effective with respect to rapid collection of species from a wide range of microhabitats. The first method, visual search, involved collecting spiders that were seen at ground level, for instance, under logs, inside rotting logs, inside holes, under bark and rocks, to arm's length above the head (approx. 0.5 m). Sweep-netting involved sweeping the vegetation with an insect net. This action serves to dislodge spiders that are in retreats or resting on the vegetation. This method collects diurnal and nocturnal species and non web-building species. The third method, pitfall trapping, targeted ground-dwelling spiders and involved setting 70 pitfall traps in four diverse localities for several days. Each pitfall trap consisted of a plastic cup approximately 11 cm deep. The cup was placed in the soil so that the lip of the cup was level with the ground. It was filled two-thirds of the way up 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 that fall in will not float on the surface and hence escape from the trap. Twenty pitfall traps were randomly placed in three of the four localities chosen for this sampling method. However, only ten traps were placed in the final locality because the soil proved too embedded with roots to allow one to dig with relative ease to place the traps. At each locality, the traps were placed within half a metre of each other, in an area of approximately $25m^2$. This was done so as to increase the likelihood of a spider's entering a trap in the sample area. After the sampling period the traps were removed, the contents collected and the traps disposed of.

All specimens collected were transferred and stored in glass vials filled with 96% alcohol.

RESULTS

The sampling effort produced a total of 21 species in ten families of spiders. Overall, habitats that have been altered by human activities and natural habitats contained almost

equal numbers of species, containing 13 and 12 species respectively. Roadside vegetation produced the highest level of species richness yielding ten species, while gardens produced the lowest level of species richness producing only two species (see Table 2).

Table 2.
Showing the species of Araneomorphae spiders for each habitat sampled in Great Inagua, Bahamas, for the period December 29, 2010 to January 7, 2011.

Families & Species	**Man made habitats**			**Natural habitats**			**Pitfall traps**
	Garden	**In & on Buildings**	**Roadside**	**Dwarf Forest**	**Mangrove**	**Coastal Vegetation**	
Araneidae *Argiope argentata*	✓		✓	✓	✓	✓	
Gasteracantha cancriformis			✓	✓	✓	✓	
Metepeira datona				✓	✓	✓	
Eriophora sp.						✓	
c.f. *Zygiella* sp.	✓				✓		
Cyrtophora citricola			✓				
c.f. *Araniella displicata*						✓	
Araneus or *Eustala*				✓			
Tetragnathidae *Leucauge argyra*			✓		✓		
Tetragnatha nitens					✓		
Thomisidae c.f. *Misumenops asperatus*				✓		✓	
Salticidae Sp A						✓	
Sp B			✓				
Menemus bivittatus		✓					
Pholcidae *Physocyclus globosus*		✓					
Theridiidae *Argyrodes elevatus*			✓		✓	✓	
Latrodectus geometricus			✓				
Oxyopidae *Oxyopes salticus*			✓				
Miturgidae *Cheracanthium inclusum*		✓	✓		✓	✓	
Nephilidae *Nephila clavipes*			✓				
Lycosidae Sp A							✓
TOTAL	2	3	10	5	8	9	1

The family Araneidae was the most species rich, yielding eight species. It was also the most ecologically diverse family containing species collected from five out of the six habitats sampled, followed by Miturgidae which was collected from four habitats (see Table 1). However, three families were documented as only being present in a single habitat; these habitats were in and around houses and roadside. Further sampling might show these to occupy multiple habitats.

Finally, of the 70 pitfall traps set, only a single trap yielded a single individual of the ground-dwelling family Lycosidae.

DISCUSSION

The islands in the Eastern Caribbean have exhibited either greater species richness in natural habitats over man-made habitats as in, Grenada (Sewlal, 2009b), Montserrat (Sewlal, 2010a) and Antigua (Sewlal, 2009a) or vice versa, as in Nevis (Sewlal & Starr, 2007) and St. Kitts (Sewlal, 2008). Neither of these trends applies to Great Inagua which has an almost equal distribution of species in natural and man-made habitats.

In this survey it was found that the level of species richness exhibited by man-made habitats was slightly higher than in natural habitats. This is most likely, as, they provide numerous and/or suitable points of attachment for families that construct webs to catch their prey. Some altered habitats such as the roadside contain features that encourage the presence of spiders; for instance, it provides a natural path or gap in the vegetation where prey—in particular, flying insects—can be blown into 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 relatively steady food supply. These factors may also account for the members of two of the three families, which are web-builders, being found only in altered habitats. However, roadside was the only altered habitat that showed a high level of species richness, containing ten species. An explanation of this could be that of all the areas of man-made habitats sampled, roadside had more features that encouraged spider occupation when compared to the other altered habitats.

In this study, the species richness of natural habitats was distributed over the three habitat types sampled. The fact that most of the localities are not heavily populated or cultivated could account for the relatively high level of species richness and diversity of the natural habitats. However, none of the natural habitats sampled exhibited a level of species richness as high as roadside habitat (10 species). All the habitats were exposed to harsh conditions, such as constant exposure to strong winds; however, features such as gaps in the vegetation and artificial lighting could be responsible for encouraging more spider species in these areas. The island was also hit by several hurricanes in recent years which would cause damage to the vegetation, destroying microhabitats, so that it would take time for specialist species to become established after a hurricane has passed over the island. Therefore future sampling over an extended period might reveal more species as the vegetation becomes more established, developing more levels of vegetation.

Compared to other islands in the region like those that have been sampled in the Eastern Caribbean, Great Inagua did not have any spiders belonging to the order Mygalomorphae, commonly referred to as tarantulas. Of all the species found during this survey, *Latrodectus geometricus* belonging to the family Theridiidae is considered potentially dangerous to humans. Bites from this genus is documented as commonly causing nausea, cramps and severe muscle pain, and are occasionally fatal (Garb, Gonzalez, & Gillespie, 2003). Although this species was only found in roadside vegetation

on the island, it has been recorded from around buildings in other islands in the region (J.N. Sewlal, personal observation, 2007, 2008).

Web-builders, in particular aerial web-building species, dominated the sampling yield (see Figure 1) followed by foraging spiders that are found on vegetation (approximately 24%). This heavy preponderance of web-building spiders, especially of orb-weavers, may be due to the more extensive use of collecting methods directed toward species that can be seen under ordinary circumstances.

The choice of habitat selection by the spiders found on the island was not compared to the topography of the island as most of the island is gently undulating with a slight variation in elevation from about 0 to 50 m.

CONCLUSIONS

The information from this study serves to provide a current list of the spider fauna of the island. The results of this survey added 12 species and six families to the list of known species for the Bahamas. Voucher specimens are deposited in the Gerace Research Center of the College of the Bahamas and the Land Arthropod Collection of the University of the West Indies.

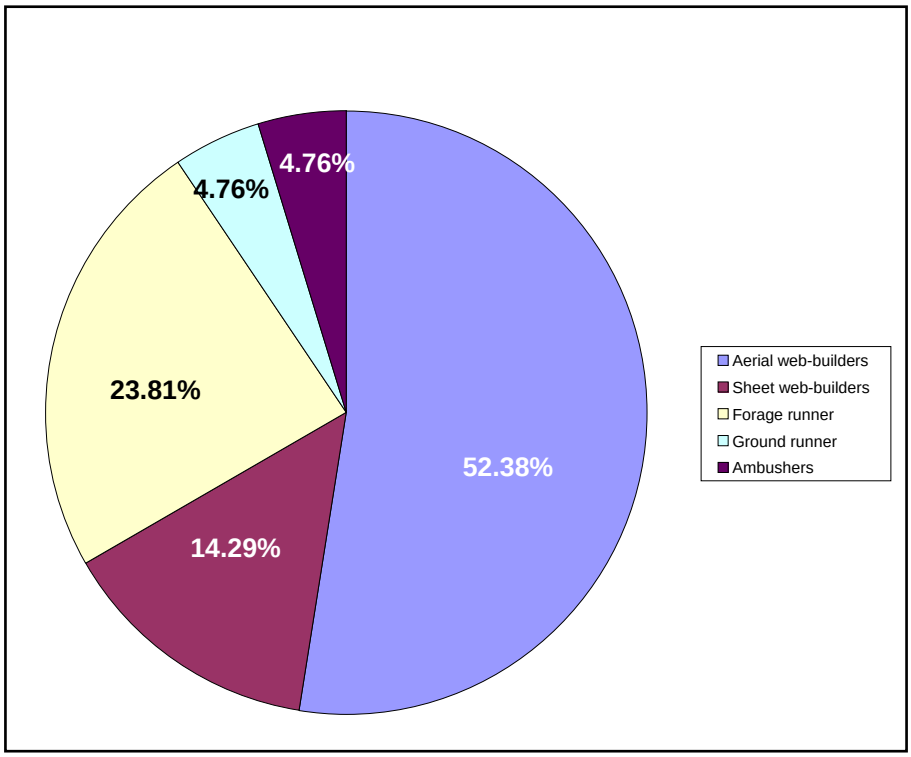

Figure 1.
Pie-chart showing percentage of species according to guild structure

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