

A Photographic Survey of Dominican Aculeate Hymenoptera

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Abstract:

Several types of traps were utilized to capture the Hymenoptera samples described in this survey. They were found in five locations on the island of Dominica in the Lesser Antilles over a 14 day period. Insect specimens were collected using Malaise traps and yellow pan traps and preserved in 96% alcohol. Hymenoptera insects were separated and later classified by family. Identified specimens were photographed and included in this survey for clarification.

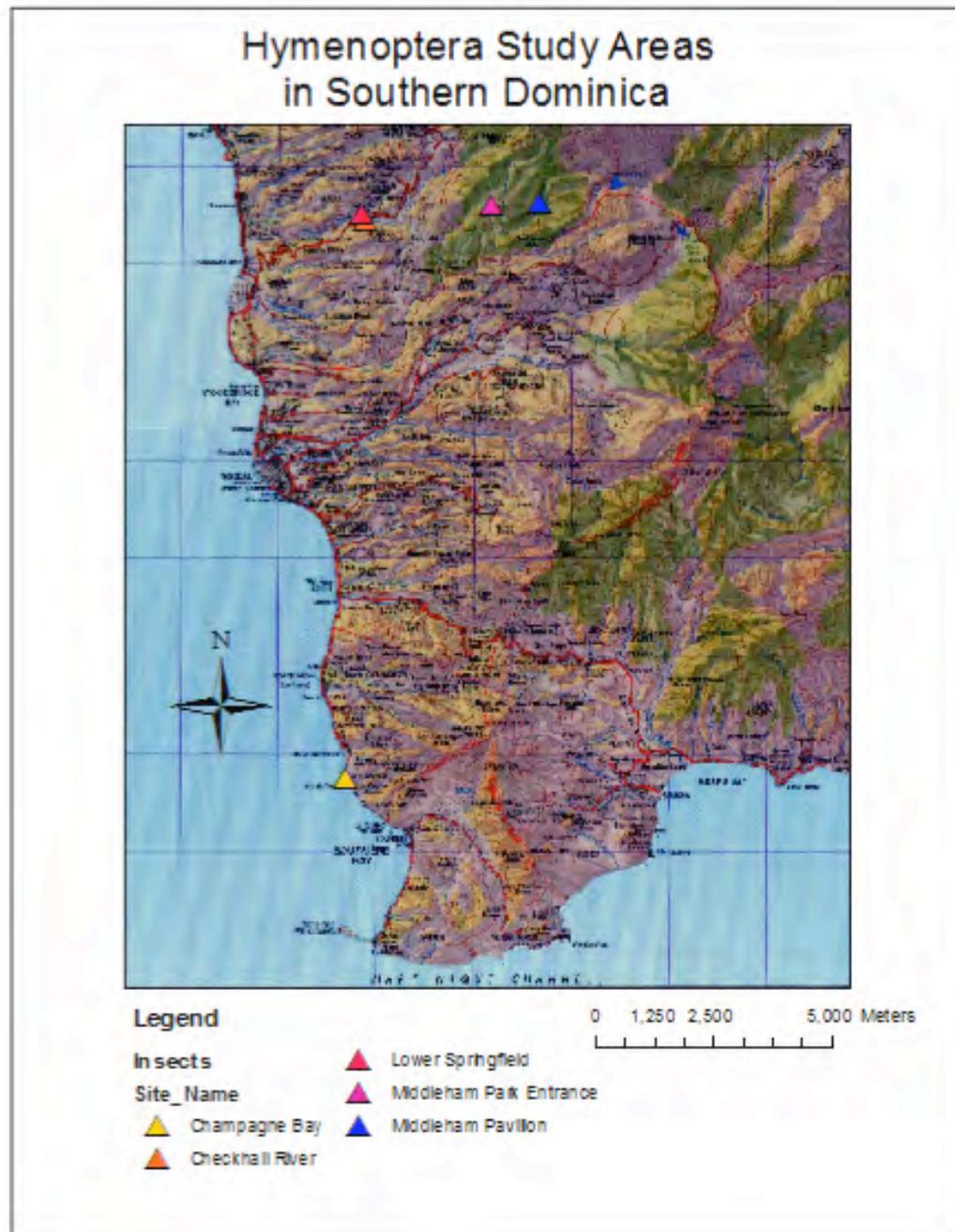
Introduction:

The island of Dominica is located in the Lesser Antilles in the eastern Caribbean. It is just South of Guadeloupe and North of the island of Martinique. Dominica is known as the “Nature Island” and rightly so as the flora and fauna are extremely abundant and diverse. During this research, I stayed at the Archbold Tropical Research and Education Center located in Springfield, Dominica in the proximity of the Check Hall River (Figure 1). This location has been conducive to many research groups and projects since its establishment in 1989.

Hymenoptera, which include wasps, ants, and bees, are an important group to study because of their value as parasites and pollinators. They can be characterized by their four membranous wings (for those winged members), complete metamorphosis, and leg, antennal, thoracic, and abdominal characteristics. Scientists from various respected institutions including Smithsonian Institute, Texas A&M University and several entomological societies have widely explored Dominica for Hymenoptera (Evans, 1972; Wells, 2003; Schulmeister, 2010). The country has unique populations in many sub regions of the island. Hymenoptera from 10 families of aculeate wasps and 52 species have been documented in Dominica; 10 species of which are

endemic (Evans, 1972). The objective of this study is to document the different families of aculeate Hymenoptera discovered from different sites on Dominica. Formicidae is represented but not the focus of this study and not elaborated on.

Figure 1:



Materials and Methods:

Eight sites were sampled for Hymenoptera specimens (Figure 1). The first ground Malaise trap was set at the head of the trail/entrance to Middleham Falls on Friday, May 28. One aerial Malaise and one more ground Malaise was set on the same day at the pavilion at Middleham Falls trail. These traps were collected on Tuesday, June 1 and again on Monday, June 7. An additional aerial Malaise trap was set on the cliff at the shore of Champagne on Friday, June 4 and was collected on Tuesday, June 8 (Figure 2). An additional ground Malaise was set just off the trail of the Check Hall River on Sunday, June 7 and was collected on Thursday, June 10 (Figure 3). I used yellow pan traps on Thursday, June 3 on the trail of the Check Hall River and at the river bed. I also did pan trapping on Sunday, June 6 on the hill that is just right of the Archbold Tropical Research and Education Center near to the Massacre Trail/Lower Springfield.



Figure 3: Ground Malaise trap deployed at Check Hall River Trail

I used Malaise traps because of their ability to be left for several days and because they are especially designed for flying insects. I used 96% alcohol in order to preserve the insects during the several days that they were left out. The only drawback is that it has a lot of by-catch which made

sorting tedious. I used yellow pan traps with soapy water to lure the pollinator Hymenoptera because they are attracted to the bright color of the pan, which mimics a flower. The insects drown in the water because of the reduced surface tension from the soapy water. These traps were set at approximately 1000 and were collected at 1700.

After collection, the insects were pinned using size 2 pins and placed in collection boxes with moth balls for preservation and further classification. Classification was done to family using the above stated characteristics and the key provided in the *Borror and DeLong's Introduction to the Study of Insects* (2005). A Leica EZ 4 dissecting microscope was used to magnify characteristics on many of the smaller specimens. Multiples of the same species that were collected in the same trap were preserved in alcohol with one specimen pinned in the collection box as a representative of that species.

Results and Discussion:

The collection of Hymenoptera species was primarily achieved using the aerial Malaise traps (Table 1). They were very efficient because most of my targeted Hymenoptera were fliers. The yellow pan traps were not successful for Hymenoptera collection but were very good for Diptera as most of my pan traps were filled with them. By far the most common Hymenoptera I collected were the Formicidae but since their diversity is so great and there have been substantial data collected on them, I did not keep careful records of their numbers or diversity within my samples (Table 1).

Some sources of error could be due to old equipment. Several of the Malaise traps had large holes that were patched using tape; however, weather caused the sealed holes to reopen. This could have caused many potential samples to escape and not be recorded. Another source of error

Table 1: Hymenoptera species and morphospecies (M.#) by family and collection site.

Family	Middleham Pavillion (Ground)	Middleham Pavillion (Aerial)	Middleham Trail head (Ground)	Champagne Beach (Aerial)	Check Hall River (Ground)	Check Hall River (yellow Pan)	Massacre Trail hill
Andrenidae							
M. 1 (Fig. A)	X	X					
M.2 (Fig. B)	X	X		X			
Apidae							
M.1 (Fig. C)		X					
M.2 (Fig. D)	X					X	X
Dryinidae							
M.1 (Fig. E)	X	X			X		
M.2 (Fig. F)		X					
Pompilidae							
M.1 (Fig. G)						X	
M.2 (Fig. H)			X				
M.3 (Fig. I)			X				
Formicidae							
M. Representative (Fig. J)	X	X	X	X	X	X	X
Sphecidae							
M.1 (Fig. K)		X					
M.2 (Fig. L)		X					
M.3 (Fig. M)		X					
M.4 (Fig. N)		X					
M.5 (Fig. O)	X	X					
Vespidae							
M.1 (Fig. P)	X						

could be due to weather. There were several days when rains were very heavy and this could have caused the flying insects to reduce their activities. A primary source of human error could be due to misidentification of the specimens.

Future projects that broach this topic could investigate population densities of certain families. There might be a correlation between family suitability to certain areas and habitats. An exploration of populations of Hymenoptera species at different heights could be useful as well.

A descriptive guide to the Hymenoptera specimens follows, organized by family, and supported by photographic plates.

Andrenidae:

These small bees have two sulci under each other their antennal sockets. They can be found in locations with low amount of vegetation when in large numbers. They are ground burrowers with approximately 1,200 species; the majority of which belong to the genus *Andrena*. They are extremely common in the springtime (Triplehorn, 2005).

M.1) Figure A. Small and generally black with longer dorso-ventrally flattened shaped and slightly hairy. Head is wasp like with large eyes. Abdomen is bulky and curved downward.

M.2) Figure B. Generally the same shape as Figure A but abdomen is slightly more narrow, hairy, and long. Body is dark brown and thorax has green iridescence. The hairs are longer on the abdomen and are slightly yellow in color. Appendages have a yellow tint.

Apidea: (Cuckoo , Digger, Carpenter, Bumble, Orchid, Honey, and Stingless Bees)

This large family of bees consist of pollinators and are usually solitary animals. They often have hairy legs in which pollen collects on. These bees can sting when defensive and usually die afterwards as withdrawing the stinger fatally ruptures their abdomen. This family is extremely widespread and due to the introduction of the Killer Bee into several populations these bees are expanding their range (Stiling, 1986).

M.1) Figure C. The body is a very typical looking bee with very little hair. Color is mostly black with yellow mouth. The hairs are yellow tinted and has a yellow/orange striped abdomen. It has a very stout body with wide thorax and abdomen. Wings are short and mostly transparent with brown venation.

M.2) Figure D. Body is similar to Figure C but is black and significantly more hairy. Abdomen is a bit stouter than Figure C and appears to have a stinger.

Dryinidae:

A small family typically limited to the Nearctic that parasitizes Hemiptera Auchenorrhyncha. There is severe sexual dimorphism and confirmation of the species is extremely difficult and can usually only be clarified by rearing them. Both sexes have 10 segmented antennae and can be characterized by their large head and toothed mandibles. Some females have pincer-like front tarsi that they use to capture their hosts and can also mimic ants (Triplehorn 2005).

M.1) Figure E. Slender body with relatively no hair. Abdomen is glossy and very little ridging. Wings and antennae are long and slender. Body is black with the exception of legs which are yellow and the wings which are dark brown.

M.2) Figure F. Body structure is similar to Figure E. Wings are almost transparent and legs distinctly yellow. Body is iridescent green and has a metallic sheen. Abdomen and antennae are black.

Pompilidae: (Spider Wasps)

These are thin wasps with long legs and a characteristic transverse sulcus across their mesopleuron. They have quadrate pronotum in lateral view. Most are darkly colored and have yellow to brown wings. This family is often mimicked by the Sphecidae and Ichneumonidae families. Most larva of this species feed on spiders and uses several methods of preying upon them (Triplehorn, 2005).

M.1) Figure G. Black wasp-like body with a large blunt head. Eyes are large and antennae are curly and based close to the mandibles. Legs are unusually long, especially the last pair. Very little hair and wings are long, thin, and brown.

M.2) Figure H. Body is jet black with a wasp shape. Head is blunt with large eyes. Mouth appears yellow and thorax and abdomen are long and slender. Wings have black venation and extend the length of the body and appear rigid. Legs are very long and have spurs.

M.3) Figure I. Head, wings, and thorax are very torpedo in appearance. Body appears black and similar to a praying mantis. Antennae are curly and eyes are almond shaped. Legs are long and spindle like. Wings are black and narrow when folded. Abdomen is large and broader than the rest of the body.

Formicidae: (Ants)

This is one of the most widespread and diverse families of Hymenoptera. They are the most successful of all insects and reside in almost every terrestrial habitat. Ants are social and have

unique social and architectural structures. Many winged ants resemble and are often confused with wasps. A very distinctive structure is the one to two segmented pedicel metasoma. Feeding habits and habitats are varied and can either consist of meat, vegetation, fungus, or sugar/nectar substances (Triplyhorn, 2005).

M. representative) Figure J. Light brown coloration with a long, slender body. Abdomen is slightly hairy with one pedicel metasoma and legs are long and thin. Antennae are elbowed. Eyes are small and situated on top of the head.

Sphecidae:

This family of wasps is unique in their pronotum structure which has a straight posterior margin and a constriction between the pronotum and the mesoscutum. Most sphecids do not have notched inner margins of the eyes. Sphecids are similar to bees in pronotum structure but differ in hair and hind tarsal structure. Sphecids have complete venation and are mostly moderately sized. They nest in the ground or natural cavities and some construct mud nests (Triplehorn, 2005).

M.1) Figure K. Abdomen is black and slender. The thorax and head are metallic green and legs are yellow. Wings are transparent and have distinct venation. Head is blunt with large eyes. Antennae are long and have many segments.

M.2) Figure L. Body is metallic black and abdomen is glossy. Head is blunt with large eyes situated near the mandibles. Antennae are highly segmented, elbowed, and thick.

Appendages are black and wings are grey with black venation.

M.3) Figure M. Eyes are very large and the most distinctive feature with antennae highly segmented and elbowed coming from mandible area. Body is small and black. Abdomen is same size as thorax.

M.4) Figure N. Body is very long and narrow and almost resembles a dragon fly. Wings are narrow, transparent and have black venation. Body is Black with yellow in between segments. Legs and mouth are yellow. Antennae are very segmented.

M.5) Figure O. Body is orangey-red on the head and thorax. Abdomen is black and appears to have a stinger. Head is small and antennae and eyes are black. Antennae are long and curly. Appendages are black and legs are slender. Wings are striped transparent and black and have venation with many cells.

Vespidae: (Paper, Mason, and Potter Wasps, Yellow Jackets, and Hornets)

These large groups of common and widely recognized insects are mostly black or brown with yellow to white markings. Some are social and have a hive that is similar in social structure as the Formicidae. Their nests can be made of wood or foliage and are usually light and thin. These insects are typically moderate to large in size (Triplehorn, 2005). Vespids typically have their wings folded longitudinally at rest and their first discoidal cell of FW is greater than half the wing length and are characteristically longer than pompilids (Bartlett, 2010).

M.1) Figure P. Body is large and characteristically wasp-like. Wings are thin when closed and orange in color. Head, legs, antennae, and thorax are black with yellow stripes. Abdomen is orange, black, and yellow striped. Head is blunt with large eyes.



Andrenidae: Figure A: Aerial Malaise Trap; Middleham Falls Trail-5/28/10-6/1/10(left), Figure B: Aerial Malaise trap; Champagne Beach-6/4/10-6/8/10(right).



Apidae: Figure C:Aerial Malaise Trap; Middleham Falls Trail-6/1/10-6/7/1(left), Figure D: Yellow Pan Trap; Check Hall River-6/3/10(right).

Dryinidae: Figure E: Aerial Malaise Trap; Middleham Falls Trail-5/28/10-6/1/10(left), Figure F: Aerial Malaise Trap; Middleham Falls Trail-5/28/10-6/1/10(right).





Pompilidae: Figure G: Pan trap; Check Hall River Trail-6/3/10 (top left), Figure H: Ground Malaise; Middleham Falls Pavillion-6/1/10-6/7/10(right), Figure I: Ground Malaise Trap; Middleham Falls Trail-6/1/10-6/7/10(bottom left).





Sphecidae: Figure K: (top
(bottom) all from Aerial N

er right), Figure O:

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