SURVEY AND COMPARISON OF THE ANT FAUNA (HYMENOPTERA: FORMICIDAE) OF SECONDARY FOREST AND SEVERELY IMPACTED REGIONS OF DOMINICA.

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Introduction

Bestelmeyer (1996) reports that there has been an increasing demand for ecologists to "evaluate the effects of anthropogenic change on the structure and function of communities and ecosystems." In tropical and subtropical regions ants are abundant and might provide useful information about biotic responses to disturbances in the ecosystem (Bestelmeyer,1996). However, in a report of the West Indian ant fauna, Wilson (1988) claimed that some of the Antillean islands, including Dominica, "have never been carefully collected." This lack of information presents a crucial void for ecologists that want to use ants in disturbance studies. Here, I attempt to fill this gap for Dominica by providing a sample of the ant fauna. In addition, I present a rudimentary quantitative comparison of the ant species richness between two areas (secondary forest and severely disturbed area).

Methods and Materials

Study area

The study was conducted in the Commonwealth of Dominica, an island in the West Indian archipelago. It is of volcanic origin and covers an area of 728km^2 (Wilson, 1988) in the Lesser Antilles. The three highest peaks of Dominica are Morne Diablotin at 1447m in the northern part of the island, Morne Trios Pitons at 1380m and Watt Mtn at 1224m in the Southern part. This neotropical island receives an average of 50 inches of rainfall in its driest areas and up to 300 inches in its wettest areas per year (Honychurch, 1991). The elevation at the test sites ranges from 537m in the secondary forest test site to about 30m in the severely disturbed test site. The survey ran from mid May to early June, which lies at the beginning of the Dominican rainy season. The secondary forest test site was in the southwestern part of the island. The total area was about 34,000m^2. I recognized the area as a secondary forest under Myers (1980) definition of secondary

forest: the regrowth of plant life after a primary forest has been cleared, peaking at about 15 years. The disturbed area test site was conducted in the capital of Dominica, Roseau. The total area of the Roseau test site was about 160,000m^2. A port on the Atlantic Ocean borders the Western side of the Roseau test site. The mouth of the Roseau or Queens River emptying into the Atlantic forms the Northern border and continuation of the city borders the Eastern and Southern edges of the site. The Roseau site is primarily occupied by the business district and to a lesser extent, homes and a food market.

Collecting procedures

I took two approaches to ant collecting. One was passive and mainly consisted of baited traps and pitfall traps. Both types of traps allowed me to set them in a given location and return at a later time to recover them. The baited traps served as a short-term passive collection method and were usually left out in the field for an hour to several hours. These traps were built from 2ml centrifuge tubes. Six holes were drilled into opposite sides of the tube; this allows the bait smell to escape the tube and the ants to enter. On the bottom end of the tube (i.e. opposite to the screw cap) another hole was drilled. A short piece of thread, about 40cm long, was passed through the bottom end hole. A knot was tied on the end of the thread that faces the opening of the tube. This kept the thread from slipping out of the hole when pulled from the opposite side. The primary purposes of this piece of thread were to serve as a trap site marker and as a handle to pull the trap out of the ground when it was buried. I used protein and carbohydrate baited traps. Tuna (in water) was the protein bait that I preferred using but sometimes I had to use pork sausage. For the carbohydrate-baited traps I used plantain bananas. Pitfall traps served as a longer term collecting device that allowed me to leave them out in the field for up to a week. I used 50ml centrifuge tubes and buried them into the ground. Once the tubes were buried so that the lip was flush with the ground they were filled with a preservative (i.e. usually alcohol or antifreeze). The second approach that I used to collect ants was a more aggressive technique that consisted of me actively searching and aspirating ants. I used a standard type aspirator that uses a rubber bulb; the bulb produces a suction force when it is squeezed and released. I found the latter type of aspirator to be safer (especially when aspirating Formacine ants that eject volatile acids when disturbed) and more practical in field rather than the type of aspirators that required me to suck into a

tube to create the suction force. Whenever I collected trap samples or aspirated ants, I would allot them a temporary field number and would record all location data and field observations in a temporary field notepad.

Preservation methods

At the end of each collecting day, all field information and ant samples were transferred to a permanent log and sorted into vials, respectively. A master log in which I keep a permanent collection numbering system independent of the field numbers. After the field numbers were transposed to the master log and field information recorded, the specimens were transported to glass vials that contained 70% alcohol solution. If the ant samples were very filthy the alcohol was changed out the next day. The last step was to identify the specimens. Each specimen was mounted according to the procedures described in Barry Bolton's *Identification Guide to the Ant Genera of the World* (pg.3-4). The latter was also used to identify the specimens to subfamily. Further identification to genus was not feasible. Thus, I separated groups within each subfamily into morphospecies. Morphospecies was defined as specimens within a known subfamily that displayed significant external morphological differences that allowed me to loosely recognize it as a particular species. This allowed me to predict the number of species that I had collected within a given subfamily by relative comparison of specimens.

Data

Total subfamiliesin both sites	**Total morphospecies in both sites**
Myrmicinae	4
Formicinae	3
Ponerinae	2

Mt. Joy site (secondary forest)

subfamilies	**#of morphospecies**
Myrmecinae	1 = M1
Formicinae	3 = F1,F2,F3
Ponerinae	2 = P1,P2

Roseau site (highly disturbed)

subfamilies	**#of morphospecies**
Myrmecinae	3 = M2,M3,M4
Formicinae	1 = F3

Results

A total of three subfamilies were collected in the entire survey and nine morphospecies were recognized. In the Mt. Joy site three subfamilies were collected and a total of six morphospecies were recognized. In the Roseau site two subfamilies were collected and four morphospecies were recognized. Only one ant was found in both sites, a Formicinae morphospecies, F3.

Conclusion

I collected a total of three subfamilies and recognized nine morphospecies in both the secondary forest and Roseau test site combined. In comparison, the secondary forest produced more subfamilies and more morphospecies than the Roseau site. There was only one morphospecies (Formicinae: F3) overlap between the secondary forest and the Roseau site. It is worth mentioning that leaf litter ants from the secondary forest (there as no leaf litter in the city of Roseau) were not included in this study so the ant species richness for the secondary forest is somewhat higher than reported here. Although this study was far from exhaustive, it would lead me to speculate that there is more species richness of ants in areas that have had low levels of human disturbance relative to areas that are currently being severely impacted by humans. In addition, I hope to offer a stepping stone for future investigation of the ant fauna of Dominica.

Bibliography

Bestelmeyer, B.T. and Wiens, J.A. 1996. The effects of land use on the structure of ground foraging ant communities in the Argentine chaco. Ecological applications 6:1225 - 1240.

Honeychurch, L. 1991. Dominica: Isle of Adventures. Macmillan Education LTD, London and Basingstoke.

Myers,N. 1980. Conversion of Tropical Moist Forest. National Academy of Sciences Washington D.C.

Wilson, E.O. 1988. The Biogeography of the West Indian Ants (Hymenoptera: Formicidae). *In* J.K. Liebherr, Zoogeography of Caribean Insects, pp214-230. Cornell University Press.