Field Guide to Insects Found on Native Palms of Dominica

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Abstract

The purpose of this project is to generate a photo guide to the Coleoptera and Hemiptera found on two native palms growing on the island of Dominica. The palms that were included in the guide are *Euterpe broadwayi* and *Geonoma interrupta*. The species *Prestoea acuminata*, *Acrocomia aculeate*, and *Syagrus amara* as well as *Cocos* and *Roystonea* were also observed, but since no collection of beetles was made due to their location or height, they are not included in the guide.

The guide combines information from various references on each of the species of beetles, their general characteristics, and the species of palm tree where it was located as well as its worldwide distribution. The method of collection was also noted as well as any observed behavior of the insects. Color photographs of the different insect families were taken using a Nikon D300 digital camera. Images were then saved as RAW files and were converted to jpg files in order to incorporate them into a Microsoft Word document. While in Dominica much effort was put in to finding the specific palms as well as observing them and collecting as many of the beetles on the palms as possible for identification. The location of these palms was also noted as well as the prevalent habitat characteristics. The number of insects that were collected and photographed included seven families: Chrysomelidae, Cerambycidae, Curculionidae, Elateridae, Cixiidae, Cercopidae, and Tingidae After using the identification keys in *An Introduction to the Study of Insects* 7th edition by Donald J. Borror, Charles A. Triplehorn, and Norman F. Johnson the subfamilies Eumolpinae of the family Chrysomelidae, Cerambycinae of the family Cerambycidae, and Scolytinae of the family Curculionidae were identified.

Introduction

Dominica, the nature island of the Caribbean, is known for its natural beauty and lush mountainous rainforests. Included in its diverse flora are many indigenous species of palms. These palms contribute to the island's heritage and are used for food, drink, basketry, handicraft and floral arrangements as well as religious celebrations (Lack 1997) The beetle diversity in Dominica is outstanding as well as the assorted types of palms and palm like plants in the various forest regions on the island. This guide mainly focuses on the Coleoptera and Hemiptera who were located on the palms of *Euterpe broadwayi*, *Geonoma interrupta* ,*Prestoea acuminate*, *Acrocomia aculeate*, and *Syagrus amara*. No collection of insects on the palm species of *Cocos* and *Roystonea* were taken due to their height and inability to obtain collections. No guide or photographic guide of the specific insects found on these palms has been published. Both descriptions of the palms and photographs of the insects collected from these specific palms will be included in this study and photographic field guide.

Materials and Methods

The insects were observed and collected at locations and at elevations at which hikes and walks were taken and also at locations in the forest that the maximum number of insects could be found. These were primarily collected at Springfield Station, MorneTrois Pitons National Park (Middleham Falls Trail), Mount Joy Trail, the Massacre Trail down from the Springfield Station and Cabrits National Park. The insects were collected by using beating sheets, canvas and mesh sweep nets, an aspirator and a pair of soft forceps.

Each of the five individual collecting kill jars used were filled with 95% alcohol in order to preserve the insects and keep them intact until there was an opportunity to pin them.

Collections were performed in the morning right after breakfast, at various times during the day, and periodically towards late afternoon. The techniques used for collecting consisted of trail hikes, and walks along the trails of the different forest types. Walks that occurred right after breakfast proved to be the most successful for finding insects on the palms which may have been due to the cooler climate before the heat of the day.

The habitats in which the insects were collected from were the secondary forest, which was near the Springfield guest house, transitional forest which consisted of the Springfield Estate, the primary tropical rainforest which was Middleham National Forest, dry forest which was the Cabrits National Park in the northwest of Dominica.

Once collected the insects were kept separated in vials with with 95% alcohol. Inside the jar I placed a slip of Resistall paper labeled with the date and location, as well as the species of the palm it was collected from. The insects that had been collected were transported in their vials with identification information to the dry lab at Springfield Station so that they could then be keyed out and identified. Once they were curated using black enameled size three pins, they were stored in a Schmidt box in a cabinet with a moth ball to keep ants and other insects from harming the specimens. The microscope that I used to identify the insects was a Leica® EZ4 microscope. The two primary resources used in keying out and identifying these insects were the *Peterson Field Guides: Beetles* by Richard E. White and *An Introduction to the Study of Insects* 7th edition by Donald J. Borror, Charles A. Triplehorn, and Norman F. Johnson.

Professional quality photographs were taken of the insects by Xanthe Shirley who used a Nikon D300 digital camera. The photographs were saved as RAW files and then later converted to jpg files in order to be incorporated into a Microsoft Word document.

Voucher specimens of all species of Coleoptera and Hemiptera collected were diagnosed in the insect collections at Archbold Tropical Research and Education Centre and Texas A&M University.

Results

Family of Insect	**Common Name**	**Location of Collection**	**Dates of Collections**	**Species of Palm(s) Collected From**	**Distribution**
Chrysomelidae **Subfamily:** Eumolpinae	Leaf Beetles	Mount Joy Trail Massacre Trail	05/26/12 05/27/12 05/28/12 06/01/12	*Euterpe broadwayi* *Geonoma interrupta*	Dry forest Transitional Forest Tropical Rainforest
Cerambycidae **Subfamily:** Cerambycinae	Long-Horned Beetles	Springfield Field Station	05/27/12	*Euterpe broadwayi*	Transitional Forest
Curculionidae **Subfamily:** Scolytinae	Weevils or Snout Beetles	Massacre Trail	05/27/12	*Euterpe broadwayi*	Transitional Forest
Elateridae	Click Beetles	Massacre Trail	05/27/12	*Euterpe broadwayi*	Transitional Forest
Cixiidae	Planthoppers	Mount Joy Trail	05/28/12 05/29/12 05/30/12	*Euterpe Broadwayi* *Geonoma interrupta*	Transitional Forest Dry Forest Tropical Rainforest
Cercopidae	Frog Hoppers or Spittlebugs	Massacre Trail	06/01/12	*Geonoma interrupta*	Transitional Forest
Tingidae	Lace Bugs	Cabrits National Park	05/28/12	*Geonoma interrupta*	Dry Forest

Families found on Palms in Dominica

Palm Species of Dominica

Acrocomia aculeate

Acrocomia aculeate palm is characterized by its very sharp black spines protruding from its trunk. It is found in the drier coastal woodland areas on the western side of Dominica. This palm has yellow flowers and yellowish green fruit that have a single dark brown nut like seed that contains a dry white filling that tastes like coconut. The pulp and kernels of these fruits are eaten as snacks in Dominica and can sometimes be purchased at the fresh produce market in Roseau. *A. aculeate* can reach a height of approximately fifteen meters and is widespread throughout the Caribbean Islands, Mexico, Central and South America (Zona 2003).

Euterpe broadwayi

Euterpa broadwayi is a small, common palm found above 750 m elevation in steep river valleys and on exposed mountain ridges within the Northern Forest Reserve, the Morne Trois Pitons, and Morne Diablotin National Parks (Zona 2003). This palm with small white flowers is tall (26 to 66 feet) and slender (8 to 10 inches in diameter) with two or three stems that can be solitary or clustering and grey in color. The common names of *E. broadwayi* are Manac and Manicol, and they can be found in Trinidad, Tobago, Grenada, and St. Vincent as well as in Dominica where the north-eastern villages use the leaves to make brooms and many people consume the edible palm buds known as palm heart (Henderson 1996).

Geonoma interrupta

Geonoma interrupta is a small to medium sized palm native to the rainforest understorey. This feather leaf palm can be solitary or clustering with few stems and about fifteen feet in height (Zona 2003). It is common in Dominica in the Northern Forest Reserve, the Morne Diablotin National Park and the Morne Trois Pitons National Park. *G. interrupta* is also found in Martinique, St. Lucia, St. Vincent, Guadeloupe, and the Lesser Antilles. Its deep green leaves can be used as thatching for shelters (Zona 2003).

Prestoea acuminate

Prestoea acuminata is a small palm found in Dominica at Freshwater Lake within the Morne Trois Pitons National Park. This palm ranges in height from two to seven meters with rigid, erect leaflets. At high elevations to the mountain summits it takes the place of the *Euterpe broadwayi* (Henderson 1995). *Prestoea acuminata* can colonize landslides and tree fall gaps and it flowers from April to June with its buds attracting the Imperial Parrots. It can also be found in Cuba, Hispaniola, Puerto Rico and many islands in the Lesser Antilles (Lack 1997).

Syagrus amara

Syagrus amara gets its common name, Overtop Palm, because it grows above the surrounding forest at Morne Espagnol. This rugged palm (15 to 20 m tall) gently rises about the low, seasonally dry coastal forests in Dominica where it grows (Henderson 1996). It has green and yellow scented flowers, and its fruit is orange in color and bitter to the taste. *S. amara* is one of the most commonly utilized palms in Dominica. The spear leaves are boiled to make straw which is used in making hats, purses, side bags, and bottle wraps. This palm can also be found in the Lesser Antilles, Martinique, Guadeloupe, and St. Vincent (Henderson 1995).

Insect Superfamilies, Families, and Subfamilies Observed on Palms in Dominica

- Phylum Arthropoda
  - Subphylum Mandibulata
    - Class Insecta
      - Order Hemiptera
        - Suborder Heteroptera
          - Superfamily Tingoidae
            - Family Tingidae
        - Suborder Auchenorryncha
          - Superfamily Cicadoidea
            - Family Cercopidae
          - Superfamily Fulgoroidea
            - Family Cixiidae
        - Suborder Sternorryncha
      - Order Coleoptera
        - Suborder Adephaga
        - Suborder Polyphaga
          - Superfamily Elateroidae
            - Family Elateridae
          - Superfamily Chrysomeloidae
            - Family Cerambycidae
              - Subfamily Cerambycinae
            - Family Chrysomelidae
              - Subfamily Eumolpinae
          - Superfamily Curculionoidae
            - Family Curculionidae
              - Subfamily Scolytinae

Order Hemiptera

This is a very large order that contain a variety of insects in size, shape and color. This order is known to include the true bugs, leaf hoppers, whiteflies, aphids, scale insects and cicadas. A key characteristic of this order is their placement of their mouthparts which helps divide them into their suborders which are Heteroptera, Auchenorryncha and Sternorryncha. On the forewings of the Heteroptera there is a basal portion that is thickened and called a Hemelytron. For the suborders Auchenorryncha and Sternorryncha their wings can be held roof like over their body and both fore and hind legs are membranous but the forewings are usually slightly thickened. There are also families included in these suborders that are wingless. They can be found in a variety of different habitats including a wide diversity of vegetation.

Suborder Heteroptera

Characteristics of this suborder include their antennal segments that are separated into four of five segments or into a various number of subsegments. The legs may be modified in regards to its habitat or feeding methods. The hemelytron can vary in appearance but will usually be separated into two sections called the corium and clavus which will be separated by a claval suture (Triplehorn 2005).

Family Tingidae

This family is included in the Superfamily Tingoidae. These insects are commonly known as lace bugs and can be located on a variety of herbaceous plants (most of the time on the underside of the leaf). A distinguishing characteristic of this insect is that its dorsal surface is made up of a series of closed cells that make it resemble lace however this is only seen in adults. As nymphs, these insects appear to be spiny when looked at

closely. Some can be considered as pests due to the damage that they cause to leaves. I located this insect in the dry forest on the ventral portion of a *Geonoma interrupta* palm leaf while sweeping with a canvas net.

Suborder Auchenorryncha

The main distinguishing characteristics of this suborder is the position of their mouthparts pushed downward almost in between their legs, the position of their antennae on their face, and their ocelli placement. This suborder includes cicadas, frog hoppers, tree hoppers, and leaf hoppers. The superfamilies of Cicadoidae and Fulgaroidea are also included in the suborder. They usually have short antennae and appear to be bristle-like. They have tarsi that are three segmented and these are active flying and jumping insects.

Family Cercopidae

These insects are commonly known as spittlebugs or froghoppers. They are very small in size and have a distinct number of spines on their hind leg tibia that helps differentiate them from the leafhoppers that look very similar in appearance. Some species can have a variety of color patterns, but the majorityare typically a shade of grey or a brown taupe color. These insects can be located on a variety of different vegetation, such as trees or shrubs (Triplehorn 2005). They can sometimes be located due to their characteristic spittle located on plants which cause them to be a pest in some states in the eastern United States. I located and collected this insect in a transitional forest on the ventral portion of the stalk of a *Geonoma interrupta* palm using an aspirator as well as forceps and a vial containing 95% alcohol.

Family Cixiidae

This family of insects is included in the Superfamily Fulgoroidea. This is one of the families of planthoppers and is one of the largest. These members are usually found in the tropics but can also be distributed widely in other habitats. They are usually small in size and can be a yellow tint (Triplehorn 2005). Their forewings can also be decorated with black dots or a black pattern that at first glance can be confused with the fly Tephritidae. I located these insects in a transitional, dry, and a tropical rainforest. I collected them on the dorsal and ventral portions of the *Euterpe broadwayi* and *Geonoma interrupta* palm leaves. I collected them using my forceps and a killing jar with plaster containing 95% alcohol as well as an aspirator.

Suborder Sternorrhyncha

Common insects included in this suborder are psyllids, scales, and whiteflies. The insects are very small in size and some may be lacking antennae. They have one or two segmented tarsi and can have two pairs of wings; however some may be lacking in legs and can be wingless. These insects in contrast to the suborder Auchenorryncha are known to be quite sedentary or in the case of some scales, sessile (Triplehorn 2005).

Order Coleoptera

Common characteristics of the order Coleoptera are chewing mandibular mouthparts, two pairs of wings present, and their forewings are used as a protective shield for their membranous hind wings which are found underneath. This hardened pair of forewings is called elytra. Coleopterans have complete or holometabolous metamorphosis and they can be various shapes, sizes, and colors as well as inhabit many different types of habitats and climates. The two suborders included in this order are the Adephaga and Polyphaga.

Suborder Adephaga

Characteristics of this suborder include antenna that usually appear to be filiform or delicate and resemble thread almost. Another key characteristic of their suborder is that their first segment of their abdomen is divided ventrally or interrupted by the hind coxae of the leg. Their trochanter or primary portion of their leg attached to the abdomen usually appears to be large in size.

Suborder Polyphaga

A primary characteristic of this suborder is that unlike the suborder Polyphaga the first segment on the abdomen is not interrupted or not divided ventrally by the hind coxae of

the leg. The antenna on these beetles of this suborder varies. The trochanter or primary portion on the leg attached to the abdomen can appear to be smaller than the hind coxae or similar in size.

Family Elateridae

This family of insects is known as click beetles, and is included in the Superfamily Elateroidae. They are known as click beetles due to their ability to right themselves is they flip over by means of "clicking" which is caused by a flexible attachment in between their prothorax and mesothorax and by a spine that is found in the mesosternum. These insects are elongated in size and can be brown or black in color. Some can have two spots on either side of their pronotum which can bioluminescence for mating or predatory purposes. Their pronotum can be prolonged backwards and form a spine on either side. The larvae of these beetles are known as wire worms due to their appearance and can be considered pests. Adults and most larvae are phytophagous in their eating habits and can be found on a variety of vegetation including plants and trees. I located these insects in a transitional forest on dorsal and lateral portions of the stalk of the *Euterpe broadwayi* palm, and collected them using a mesh sweep net and a beating sheet.

Family Cerambycidae

This family commonly known as the long–horned beetles is included in the Superfamily Chrysomeloidae. This family is very large and the insects can range in size, shape, and color and well as colorful patterns. The main distinguishing feature of these insects is the length of their antennae. Another feature is that their eyes can appear to be divided close up or notched. Many are phytophagous whereas others are wood borers in their larval stages.

Subfamily Cerambycinae

Beetles in this subfamily can range in various sizes and other appearance characteristics including spots on their elytron or hardened outer wing cover. They usually have long antennae exceeding the length of their body. I located these insects in a transitional forest on the dorsal as well as ventral portions of a *Euterpe broadwayi* palm leaf. I collected them using a mesh net and a killing jar that had been activated with 95% alcohol.

Family Chrysomelidae

This family is also included in the Superfamily Chrysomeloidae. Members of this family are otherwise known as leaf beetles and their body can be small in size and oval or round in shape. They are closely related to the family Cerambycidae and both share a similar tarsal structure. They vary in color and patterns and some may even appear to be metallic. They have short antennae and can found on a variety of different flowers as well as other vegetation. They are phytophagous as larvae and adults.

Subfamily Eumolpinae

There are many leaf beetles included in this subfamily. The can be round or oval in size, and can be colored brown, black, or can sometimes appear metallic. They are found on different types of vegetation or flowers. I located these insects in the dry, transitional, and tropical rainforest. I collected them from on the dorsal portion of the *Euterpe broadwayi* and *Geonoma interrupta* palms and well as near the stalk of the palm leaf. I collected them by using a mesh net, my forceps and a killing jar that had been activated with 95% alcohol.

Family Curculionidae

Insects included in this family are also included in the Superfamily Curculionoidae. These insects are referred to as weevils, true weevils, or snout beetles. This is a very large family and they can be found in a variety of habitats and can be several different sizes and colors such as different shades of brown to blend in with soil or black. Many will be easy to identify with their snout however some species are lacking one. They can be found on vegetation and flowers usually feeding on different locations on the plant.

Subfamily Scolytinae

These beetles are commonly known as bark beetles, they small in size and cylindrical. They can vary in color and texture but they are usually light brown or black. These beetles usually live in the bark of trees and feed on phloem tissue from the plant or tree. I located these insects in the transitional forest crawling on the dorsal portion of the *Euterpe broadwayi* palm. I collected them using beating sheet as well as forceps and a killing jar that had been activated with 95% alcohol.

Discussion

Seven families of insects from the orders Coleoptera and Hemiptera were found on the palms that I observed. From my collection I narrowed it down from order to superfamily, to family, and in a few cases subfamily. Using the identification keys in *An Introduction to the Study of Insects* 7th edition by Donald J. Borror, Charles A. Triplehorn, and Norman F. Johnson, the families that I found on the palms included Chrysomelidae, Cerambycidae Curculionidae, Elateridae, Cixiidae, Cercopidae, and Tingidae The subfamilies Eumolpinae of the family Chrysomelidae, Cerambycinae of the family Cerambycidae, and Scolytinae of the family Curculionidae were identified.

The collections that were performed earlier in the day gave the best results. The palm species *Euterpe broadwayi* and *Geonoma interrupta* were the two main native palms that I collected the majority of the insects on. Unfortunately the palms, *Prestoea acuminate*, *Acrocomia aculeate*, and *Syagrus amara*, as well as *Cocos* and *Roystonea*, were not able to be collected from due to location, or no insects were located on them. Using beat sheets and a canvas or a mesh net helped me collect the beetles much easier than just solely using my forceps, a killing jar or an aspirator. I found it odd that I found Scolytinae on the *Euterpe broadwayi* palm. This may have been due to the use of the beating sheet and accidentally collecting other vegetation's insects or perhaps due to them landing on the palm for food or shelter.

Further research projects that could be done to expand on this idea would be to observe the palms and watch the behavior of the insects on the palms and determine why they are landing on it. By observing the palms and keeping count of how many insect families are found at different times of the day, it would give a better understanding of

why they are there whether it is for pollination or mating/reproductive means. Another interesting study would be to do more research with the Cixiidae and get a better understanding of why so many were located on the *Euterpe broadwayi* and *Geonoma interrupta* palm leaves and perhaps monitor their behavior. Another possibility would to place ground traps under some of the palm species in each individual type of forest habitat and then observe what insects are captured.

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