

A Photographic Field Guide to the Coleoptera of Dominica, W.I.

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Abstract

Dominica exhibits an immense amount of animal and plant species due to its diversity of habitats. Insects in the order Coleoptera represent 40% of known insects, with more than 350,000 described species. This photographic field guide shows the different families in the order Coleoptera that inhabit different areas of Dominica. 32 species from 18 different families were photographed for this guide. Further collecting, identification, and photography could aid in the expansion of this guide to help assist those who wish research the beetles of Dominica.

Introduction

The island of Dominica is located in the centre of the Lesser Antilles (15°20'N, 61°20'W) and is the largest island of the Eastern Caribbean Windward Islands measuring 30 miles long and 15 miles wide (Evan and James 1997). Because of the Trade Winds sweeping in from the Atlantic Ocean, sharp variations of temperature caused by altitude, and unique rain-shower patterns, six different types of forest occupy this mountainous island, which include littoral woodland, dry scrub woodlands, deciduous forest, rain forest, montane forest, and elfin woodland (Honychurch 1991). These forests create a vast assortment of habitats which then give rise to a rich variety of plants and animals, including the largest order of insects, Coleoptera (Evans and James 1997).

Coleopterans or beetles constitute about 40% of the known species in the Hexapoda, with more than a quarter of a million described species. One of the most distinctive characteristics of beetles is the structure of the wings. The front wings, termed elytra, are thickened, leathery, or hard and brittle. The elytra typically meet in a straight line down the middle of the back and

cover the hind wings. They function as protective sheaths and reduce desiccation. Beetles possess mandibulate mouthparts and are holometabolous. They may be found in almost every type of habitat that is populated by insects and feed on a variety of plant and animal materials (Borror and DeLong 2005).

This is a photographic field guide to the different families in the order Coleoptera that inhabit different areas in Dominica. It will aid those who wish to pursue further identification or research on the beetles that reside on the island. Each family collected and identified includes a description of their physical characteristics and the habitats where they may be found.

Materials and Methods for Collecting and Identifying

The following collection techniques were used to collect the beetles:

Manual Collection- Many of the beetles found were picked off their feeding or resting places either by hand or by the use of Bioquip soft-tip forceps. They were then placed in a killing jar containing a Kim Wipe and a few drops of ethyl acetate.

Beat Sheet- Two wooden sticks, that were bolted together in order to pivot, were placed into cornered pockets of a white sheet. The white sheet was then placed under foliage while another stick was used to strike it to knock the beetles onto the sheet. The beetles were captured using an aspirator and then placed in a vial containing 95% ethyl alcohol. This method was used within the Archbold Tropical Research and Education Center (ATREC).

Malaise Trap- This type of collection method involved a tent like structure made of fine netting that funneled insects up from in densely vegetated areas. A collection bottle was then filled with 95% ethyl alcohol and attached to the top to capture flying and crawling insects. There were both aerial and ground Malaise traps placed at Mount Joy, within the Middleham Falls National Forest, and along the steep hillside east of Champagne Reef.

Lindgren Funnel Trap- The Lindgren funnel trap was a sequence of black funnels suspended on top of one another, and was hung on a tree branch at the ATREC by a rope. At the very bottom of the trap was a container filled with antifreeze to kill the insects. The purpose of this collection apparatus was to attract the insects by mimicking a tree.

Yellow Pan Trap- Yellow dishes slightly filled with soapy water were placed around the ATREC and along the trails of Cabrits National Park and Middleham Falls National Forest. Their purpose is to mimic flowers to attract pollen-feeding insects.

Light Trap- The light trap was comprised of a rope that was tied horizontally around two upright pillars with a white sheet was positioned over the rope and secured with clothespins. The light trap was installed at the Happy Hummingbird Lounge at ATREC so that observers could both collect insects and enjoy cocktails simultaneously. A mercury vapor light was then hung over the rope and was also anchored with a clothespin. The light trap was turned on between 8:30pm to 9:00pm and left on until 12:00am - 2:00am, depending on the abundance and diversity of insects, the price of the drinks, and the stamina of the researchers. These beetles were collected using an aspirator and placed in a vial containing 95% ethyl alcohol.

The beetles were sorted using Bioquip soft-tip forceps and placed in a watch glass dish containing 95% ethyl alcohol for identification. All were identified using a Leica EZ4 compound microscope. They were then keyed out using *Borror and DeLong's Introduction to the Insects 7th edition* by Charles Triplehorn and Norman Johnson (2005) and Richard E. White's *Peterson Field Guide to Beetles* (1983).

Materials and Methods for Photographing

After the specimens were identified and dried, the specimens were placed one by one on top of a blank white sheet of computer paper that was laid on top of a Pinned Specimen Manipulator for photographing with the help of Brendan Morris. We used a Zeiss 100 mm macro lens that was attached to a Nikon D300 digital camera. The camera was then placed on a Novaflex focusing rail and was then fastened onto an Acra-Swiss ball head. This was then CAREFULLY secured to a Novaflex table tripod. A Nikon SB-R200 remote flash was then attached to the top of the camera to support three other external flashes. For smaller specimens, we used a Nikon PN-11 52.5mm lens extension, a Nikon PK-13 27.5 mm lens extension, and a Nikon PK-12 14 mm lens extension. They were either used separately or combined depending on the size of the insect. Exposures were made using ISO 125, TTL flash, and an f16 f-stop. For many of the specimens, both dorsal and lateral sides of the specimen were photographed.

Results

A total of 32 species from 18 families were photographed for this guide. Many were personally collected and others were taken from the insect collection at the ATREC. The families are listed alphabetically and numbered accordingly.

1) Family Bostrichidae



Figure 1.1 - 1.2: Dorsal (right) and lateral (left) views of a specimen in the family Bostrichidae. The rasp-like teeth found on the pronotum aid in an easily identify it. Collected by light trap at ATREC and Lindgren funnel. *Courtesy of ATREC and Brendan Morris*

Common name: Branch-and-Twig Borers

Size: 2-5mm

General Characteristics: The beetles found in this family are cylindrical in shape with the head bent down almost concealed by the pronotum when examined dorsally. The pronotum usually possesses rasp-like teeth.

Antennae: 8-11 segmented antennae that are clubbed with 3-4 segments often enlarged to one side

Tarsal Formula: 5-5-5

Habitat: Some of these beetles are known to destroy dried roots and grains, a variety of wood and bamboo products, and felled timber.

Collection method(s): Light trap and Lindgren funnel

2) Family Brentidae



Figure 2.1 -2.2: Dorsal (left) and lateral (right) views of a beetle in the family Brentidae. Those in this family are narrow, elongate, and cylindrical shape and have a snout that protrudes straight forward. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Primitive Weevils

Size: 5.2- 42mm

General Characteristics: The body is very elongate, narrow and cylindrical in shape. The body is also hairless and shiny. They possess a snout that projects straight forward. They are brown to black in color often with stripes on the elytra.

Antennae: Beadlike or weakly clubbed

Tarsal Formula: N/A

Habitat: Live and can be found in dead wood.

Collection method(s): Light trap

3) Family Cantharidae



Figure 3.1 - 3.2: Dorsal (left) and ventral (right) views of a beetle in the family Cantharidae. Its body is elongate and moderately flattened with long thread-like antennae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common name: Soldier beetle

Size: 1-15mm

General Characteristics: The body is elongate and moderately flattened that is covered in short, slightly dense setae. The colors are usually dark with yellow, orange, or red markings. The head is not concealed by the pronotum as in those in the family Lampyridae. The legs are long and slender.

Antennae: 11 segmented and thread-like

Tarsal Formula: 5-5-5 (4th segment bi-lobed)

Habitat: Cantharids can be found on flowers and foliage during the day. At night, they typically fly to lights.

Collection Method(s): Light trap

4) Family Cerambycidae



Figure 4.1-4.2: Dorsal (left) and lateral (right) views of Species A in the family Cerambycidae. Collected at night in one of the bedrooms at ATREC while resting by a window. *Courtesy of ATREC and Brendan Morris*



Figure 4.3 - 4.4: Dorsal (left) and lateral (right) views of Species B in the family Cerambycidae. Collected at night in the classroom of ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 4.5 - 4.6: Dorsal (left) and lateral (right) views of Species C in the family Cerambycidae. Collected by Lindgren funnel. *Courtesy of ATREC and Brendan Morris*



Figure 4.7 - 4.8: Dorsal (left) and lateral (right) views of Species D in the family Cerambycidae. Collected by Malaise trap. *Courtesy of ATREC and Brendan Morris*



Figure 4.9 - 4.10: Dorsal (left) and lateral (right) views of Species E in the family Cerambycidae. Collected by Malaise trap. *Courtesy of ATREC and Brendan Morris*

Common Name: Long-Horned Beetle

Size: 2-60mm

General Characteristics: The antennae of this body are always nearly at least as half as long of its body. The body is stout with broad shoulders, elongate, and cylindrical in shape.

Antennae: Filiform and very long as mentioned above (at least half its body size). Usually have 11 segments but sometimes may have 10 segments.

Tarsal Formula: 5-5-5 (appear to be 4-4-4)

Habitat: The members of this family are phytophagous, thus are found in foliage. Most were found in transitional forest.

Collection Method(s): Handpicked in areas within the ATREC (classrooms, bedrooms, etc.) at night, Lindgren funnel, and Malaise trap.

5) Family Chrysomelidae



Figure 5.1-5.2: Dorsal (left) and lateral (right) views of Species A in the family Chrysomelidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 5.3-5.4: Dorsal (left) and lateral (right) views of Species B in the family Chrysomelidae. *Courtesy of ATREC and Brendan Morris*



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Figure 5.5-5.7: Dorsal (left), lateral (middle), and ventral (left) views of Species C in the family Chrysomelidae. Collected in foliage on Mount Joy. *Courtesy of ATREC and Brendan Morris*



Figure 5.8-5.9: Dorsal (left) and lateral (right) views of Species D in the family Chrysomelidae. Collected by sweep netting around ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 5.10-5.11: Dorsal (left) and lateral (right) views of Species E in the family Chrysomelidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Leaf Beetles

Size: 1-16mm

General Characteristics: The body is generally oval and convex and sometimes depressed but usually cannot be characterized because so diverse.

Antennae: Filiform or sometimes clubbed, length usually less than half of its body

Tarsal Formula: 5-5-5 (appear to be 4-4-4)

Habitat: These beetles live on vegetation and feed on living plants.

Collection Method(s): Handpicking on vegetation, light trap, and sweep net

6) Family Coccinellidae



Figure 6.1 -6.2: Dorsal (left) and lateral (right) view of Species A in the family Coccinellidae. *Courtesy of ATREC and Brendan Morris*



Figure 6.3 -6.4: Dorsal (left) and lateral (right) view of Species B in the family Coccinellidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 6.5 -6.6: Dorsal (left) and lateral (right) view of Species C in the family Coccinellidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Lady or Ladybird Beetles/ Ladybugs

Size: 1-10mm

General Characteristics: The body is round in shape, hemispherical, and strongly convex. The ventral surface is usually flat. The head is mostly concealed when viewed dorsally. Many are very colorful.

Antennae: Usually very short in length with 8-11 segments with a weak club of 3-6 segments.

Tarsal Formula: 4-4-4 (appear to be 3-3-3)

Habitat: Many feed on aphids and scale insects, therefore residing in areas where these insects are abundant. Some come to lights at night.

Collection Method(s): Beat sheet, sweep net, light trap

7) Family Curculionidae



Figure 7.1 -7.2: Dorsal (left) and lateral (right) views of Species A in the family Curculionidae. Collected by Malaise trap at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 7.3 -7.4: Dorsal (left) and lateral (right) views of Species B in the family Curculionidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 7.3 -7.4: Dorsal (left) and lateral (right) views of Species C in the family Curculionidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 7.5 -7.6: Dorsal (left) and lateral (right) views of Species D in the family Curculionidae. Collected by yellow pan at ATREC. *Courtesy of ATREC and Brendan Morris*



Figure 7.8: Dorsal view of Species E in the family Curculionidae. Collected by unfortunately landing on one of the student's arm on the way to Cabrits National Park.

Common Name: Weevils or Snout Beetles

Size: 2-20mm

General Characteristics: The rostrum or snout of the weevil is well-developed and can either be broad and flat or very elongate and narrow. The body is often covered in scales.

Antennae: Geniculate antennae and compact antennal club with 3 segments; usually elbowed

Tarsal Formula: 5-5-5 (appear to be 4-4-4)

Habitat: All are phytophagous, therefore inhabit densely vegetated areas; may be found in transitional forest

Collection Method(s): Handpicking in vegetation (or luck), yellow pan trap, light trap, Malaise trap

8) Family Elateridae



Figure 8.1 - 8.2: Dorsal (left) and lateral (right) views of the *Ignelater luminosus*. It has two light producing organs located on the posterior ends of the thorax. Collected by light trap at ATREC. Courtesy of ATREC and Brendan Morris

Common Name: Click Beetles

Size: 3-20mm

General Characteristics: The prothorax is loosely joined to mesothorax and prolonged into a spine on each posterior corner. They can be distinguished by their prosternal spine that fits into a groove on mesosternum, which acts as a “click” mechanism. The body is usually elongate and broadly rounded on both anterior and posterior ends. The *Ignelater luminosus* (Fig 8.1 – 8.2) is a bioluminescent click beetle found around the ATREC.

Antennae: Antennae usually serrate, but sometimes filiform or pectinate

Tarsal Formula: 5-5-5

Habitat: Live on foliage of trees and bushes; may be found in transitional forest. The *I. luminosus* can be found at night at the Check Hall River and Bee House.

Collection Method(s): Light trap and beat sheet

9) Family Elmidae



Figure 9.1-9.2: Dorsal (left) and lateral (right) views of a member of the family Elmidae. Collected by hand at the Check Hall River around the stream riffles.

Common Name: Riffle Beetles

Size: 1-8mm

General Characteristics: The body is usually oval and cylindrical. The legs are long with large claws at the apical ends. The head is usually deflexed and sunk into the head. They are usually black to grey in color, with some having light markings.

Antennae: Filiform or clavate with 7 – 11 segments

Tarsal Formula: 5-5-5

Habitat: They are aquatic but do not swim. Instead, they grip onto plant debris or rocks. They may be found around stream riffles

Collection Method(s): It is best to use an aquatic net or examine the plant debris or rocks around riffled areas and handpick

10) Family Erotylidae



Figure 10.1-10.2: Dorsal (left) and lateral (right) views of a species in the family of Erotylidae. Collected by Malai trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Pleasing Fungus Beetles

Size: 2-22mm

General Characteristics: The body is elongate-oval to broadly oval and rather convex dorsally, but with a slightly flattened pronotum. They can be glabrous or inconspicuously pubescent. Most are shiny and black, often with red or yellow markings, or a few may be a yellowish color (Fig. 10.1-10.2).

Antennae: 11-segmented antennae have a distinct, sometimes flattened, usually 3-segmented club

Tarsal Formula: 5-5-5

Habitat: Usually found in rotting logs, under bark, or in mushrooms and other fungi in transitional forest.

Collection Method(s): Malaise trap

11) Family Eucnemidae



Figure 11.1: Dorsal view of a species in the family Eucnemidae. Collected by Malaise trap at Cabrits National Park.

Common Name: False Click Beetles

Size: 3-18mm

General Characteristics: The body is slender, elongate and convex, with the sides nearly parallel; the body is often broadest at the pronotum. They are brown or black in color and often covered in short, sparse setae. The head is strongly deflexed and retracted into the prothorax.

Antennae: 11-segmented antennae are sawtoothed, beaded, threadlike, comblike or fanlike.

Tarsal Formula: 5-5-5

Habitat: They may be found in the transitional forest or rainforest in decaying wood and vegetation.

Collection Method(s): Malaise Trap

12) Family Lampyridae



Figure 12.1-12.2: Dorsal (left) and lateral (right) views of a species in the family of Lampyridae. Collected by sweep net at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Fireflies

Size: 4-30mm

General Characteristics: These beetles are soft bodied, flattened, elongate to rarely oval beetles. The head is concealed when viewed dorsally by the pronotum. This family is known for its luminescent beetles. The light production is used in courtship behavior.

Antennae: Variable; may be threadlike, saw-toothed, or more rarely comb-like or fan-like

Tarsal Formula: 5-5-5

Habitat: During the day, they can be found on trunks and branches of trees. They can easily be seen at night. They have been both found in transitional forest and rain forest.

Collection Method(s): Aerial net at night or Malaise trap

13) Family Meloidae



Figure 13.1: Dorsal view of a species in the family Meloidae. Collected by light trap at ATREC.

Common Name: Blister Beetles

Size: 3-70mm

General Characteristics: These beetles are mostly elongate and slender with long legs. The body is soft and leathery and usually has sparse, short, fine setae. Colors may vary from black or black and red to yellow and orange. The head is broad and deflexed. Also, the head is almost always wider than the pronotum and constricted behind to form a short neck.

Antennae: Thread-like or bead-like antennae with 11 segments

Tarsal Formula: 5-5-4

Habitat: May be found in transitional forest on foliage and flowers.

Collection Method(s): Light trap

14) Family Mordellidae



Figure 14.1 - 14.2: Dorsal (left) and lateral (right) views of a species in the family Mordellidae. Collected by Lindgren funnel at ATREC. Courtesy of ATREC and Brendan Morris

Common Name: Tumbling Flower Beetles

Size: 1.5 to 15 mm

General Characteristics: These beetles possess a very distinctive wedge-shaped body with a humpback. They are brownish in color. The head is large and triangular when viewed anteriorly. They have enlarged hind femora that aids in jumping.

Antennae: Antennae have 11 segments. They are usually short and do not extend beyond the thorax.

Tarsal Formula: 5-5-4

Habitat: They inhabit transitional forest, feeding on pollen from flowers.

Collection Method(s): Lindgren funnel

15) Family Passalidae



Figure 15.1: Dorsal view of a species in the family Passalidae. Collected by hand from rotting wood at Mount Joy.

Common Name: Bess Bug

Size: 28-40mm

General Characteristics: These beetles has a black and shiny, elongate-robust body that is nearly parallel-sided. The elytra have grooves that run lengthwise.

Antennae: Clubbed with 3 segments

Tarsal Formula: 5-5-5

Habitat: They can be found in transitional forest in rotting and decaying wood.

Collection Method(s): Handpicked from rotting and decaying wood

16)Family Scarabaeidae



Figure 16.1: Dorsal view of a species in the family Scarabaeidae. Collected by hand on the trail of Middleham Falls in rotting wood. *Courtesy of ATREC and Brendan Morris*

Common Name: Scarab Beetles, Chafers, and Dung Beetles

Size: 2-60mm

General Characteristics: The body may be oblong to oval in shape. These beetles vary in color. The legs are fossorial, and the fore fibia are dentate with one apical spur

Antennae: Lamellate, usually with 10 segments with 3 apical segments forming a compact club

Tarsal Formula: 5-5-5

Habitat: Habitat is variable, but scarabs are found in transitional forest and rain forest.

Collection Method(s): Any method may be successful, but the most successful method is a light trap.

17) Family Scolytidae



Figure 17.1: Lateral view of a species in the family Scolytidae. Collected by light trap at ATREC.

Common

Name: Bark-and-ambrosia Beetles

Size: 1-5mm

General Characteristics: Body is elongate and cylindrical in shape. Front of pronotum may bear rasp-like teeth, which conceals head when viewed dorsally. These beetles may be brownish to black in color.

Antennae: Short and elbowed with the apical end forming a large, abrupt club of 1-3 segments

Tarsal Formula: N/A

Habitat: These beetles may be found in transitional forest and live in the bark of trees.

Collection Method(s): Light trap

18) Family Staphylinidae



Figure 18.1 - 18.2: Dorsal (left) and lateral (right) views of a species in the family Staphylinidae. Collected by light trap at ATREC. *Courtesy of ATREC and Brendan Morris*

Common Name: Rove Beetles

Size: 1-20mm

General Characteristics: The most distinctive characteristic of rove beetles are their short elytra, which usually expose at least three apical terga. The body is elongate and heavily sclerotized.

Antennae: Thread-like or sometimes clubbed with the first segment usually elongate

Tarsal Formula: Variable

Habitat: They can be found in transitional forest.

Collection Method(s): Light trap

Discussion

All of the collection techniques successfully caught beetles, but the Malaise traps and light trap yielded the most results. Collection was also based on chance and the help of the other students.

There were several complications that occurred during the collection of these insects. There was slight rainfall for the first two weeks of this study, which could have affected the results. Also, towards the end of the study, excessive rainfall caused the Lindgren funnel trap to dismantle and fall to the ground, consequently losing possible specimens. Another factor to consider is the time spent on the island, which was only three weeks. If more time was allowed to accumulate, there would have been a substantial increase in the number of beetles for the collection.

Potential studies should focus on using a greater number of collection techniques. Also, collecting in different areas that were not meticulously searched in this study could also yield more beetles. Future collection, identification, and photography are essential to expand this field guide to assist researchers, students, and anyone who aspires to learn about the elaborate diversity of beetles in Dominica.

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