

A photographic field guide to the Odonata of Dominica

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Abstract

This study was conducted to provide an illustrated guide to those exploring the odonates specific to the island of Dominica. Currently there is no known guide that solely encompasses the genera of the island. Several collecting trips using an aerial net were conducted to different parts of the island to attempt to survey the areas in which dragonflies and damselflies would be found. Specimens collected were identified to suborder, and then to genus. Specimens were pinned, spread and the photographs are included in the guide to provide further clarification of the genera found around the island. The collection resulted in five anisopteran genera in one family and three zygopteran genera in one family.

Introduction

The order Odonata contains what most know as dragonflies and damselflies. These animals are easily identified by their large compound eyes, which cover the entire sides of their head. Odonates also have an enlarged pterothorax which is the fusion of the meso- and metathorax (Garrison, 2006). The pterothorax houses the large flight muscles these aerial predators use for rapid flight. There are four pairs of membranous wings originating from the pterothorax. Odonates also have small bristlelike antennae and chewing mouthparts (Triplehorn, 2005). Males and females of anisopterans are often similar in color, but males can sometimes be brighter and the wing pattern coloration can differ in the sexes. In contrast, zygopteran males are generally brighter in color than the females (Triplehorn, 2005).

Both larvae and adults are strictly predacious and often times dragonflies will feed on their smaller damselfly relatives. Odonates also have the ability to feed on invertebrates and small vertebrates alike. The legs of odonates are long and slender, which allows them to form a basketlike structure for catching prey in flight.

Like other aquatic insects, some odonates can be indicators of ecosystem quality (Triplehorn, 2005). Both larvae (nymphs) and adults are aquatic and as adults usually spend the majority of their life around, or very close to water sources. Many species fly at only certain times of day, or during particular amounts of sunlight, whether direct or shady (Merritt, 2008).

Materials and Methods

Specimens were collected from May 22- May 29, 2009. Several collection sites were planned out and visited. In the field, specimens were placed in Glassine envelopes in a plastic container, after which they were placed in an enclosed space containing ammonium carbonate ($\text{NH}_2\text{COONH}_4$). A Leica EZ4 light microscope

was used to identify the specimens to suborder then to genus. A Magellan GPS ColorTRAK and an iPhone 3G were used to record locations around the island where the specimens were collected. Numbers of each genera were also recorded to provide further information about the types of habitats where particular odonates can be found.

On May 22, May 25 and May 29 collection trips to the Archbold Tropical Research and Education Center's (ATREC) Bee Pond (15°20'52"N 61°22'04"W) were executed. A 15" diameter BioQuip® aerial net with extendable handle was used to capture specimens from the air or off of surrounding plants. The pond was visited at different times each of the days: 900-1130 am, 845-1030 am and 130-300 pm, respectively.

At Middleham Falls (15°34'887"N 61°33'896"W) on May 23 the specimen was collected from a plant using the BioQuip® aerial net. Middleham Falls was visited on a hike that took place around 1200 pm.

The Checkhall River site located at ATREC (15°20.749'N 61°22.147'W), was visited on May 24, May 27 and May 29. Each time the 15" BioQuip® aerial net was used to collect specimens. Hand collecting was also done by approaching the animal from behind and grasping the 2 pair of wings and removing it from its perching point. The same method of visiting at different times was also used for the Checkhall River, with times of 500 pm, 230 pm, and 1230 pm, respectively.

Cabrits National Park (15°58'6295'N 61°47'2347'W) was visited on May 26, and the east side of the park was explored. Two different elevations were noted along the trail: one at 18m and one at 80m.

One collection trip to Emerald Pool (15°23.739'N 61°18.624'W) on May 30 was also taken and the specimen was collected using the hand technique.

Before and after pinning, photographs of each specimen were taken using a Nikon D300 with macro-lenses with several flashes to produce high quality images.

The following books were used in identification of all specimens to genus and in depth descriptions shown here in the report: Dragonfly Genera of the New World by J.W. Garrison, An Introduction to Aquatic Insects of North America by J.W. Merritt and Borror and DeLong's Introduction to the Study of Insects by C.A. Triplehorn.

Voucher specimens of all species collected during this study have been deposited in the insect collection, Archbold Tropical Research and Education Center, Springfield, Dominica.

Results

Suborder Anisoptera

This suborder includes dragonflies, which can be identified by the large hemispherical head, differential wing shape (hind wing base is broader than fore wing base), and venation between the fore and hind wings. Dragonflies also hold their wings horizontal when perching. Males also have a prominent epiproct at the end of the abdomen located between the cerci. Dragonflies are usually seen flying higher around the water environment and found to be more territorial than damselflies (Garrison, 2006).

Family Libellulidae

The wings of Libellulids have a distinct and well developed anal “toe” loop. The arculus in the hindwing is closer to the triangle than in the front wing (Garrison, 2006). The compound eyes in Libellulids also form an eye seam that distinguishes them from other similar families.

Subfamily Libellulinae

The animals in this subfamily are identified using the second crossvein, which is oblique in this case. This vein can be found between the RP1,2 and IRP2 veins. (Garrison, 2006)

Genus *Erythemis*

Erythemis range in size from 35-62 mm, which is a relatively large size in anisopterans. There is also no specific color; they can be red, blue, black or brown. The Msp1 and Rsp1 veins are also distinct and easily identifiable. A unique feature to this genus is found on the hind femur of both males and females: three to four strong spines on the distal ½ portion, with many short spines directed distally on the basal ½. In general this genus is blue, black, brown or even red, and not commonly metallic. *Erythemis* inhabit ponds, pools, marshes and slow streams. They can also be seen perching on vegetation in or around habitats. (Garrison, 2006)



Figure 1. Male *Erythemis*. Pterothorax is greenish yellow with dark markings. Wings are slightly tinged overall and can be found perching around territory near ATREC Bee Pond during daylight hours.

Genus *Libellula*

This genus can be medium to very large (34-63 mm). They range in color from pale yellow to dark brown, with some red to orange. Wings can have patterns of yellow, orange and brown and the sectors of the arculus are not stalked as in other genera and the pterostigma are also very long. Adults inhabit no specific type of water and can be found perching on surrounding weeds. Adult males can be seen guarding females while they oviposit. (Garrison, 2006)



Figures 2 and 3. Female (top) and male (bottom) *Libellula*. Appear bright red when flying in sunlight. Females tend to be more orange than males, and both sexes are large in size. Habitat includes ATREC Bee Pond.

Genus *Macrothemis*

Adults of *Macrothemis* have a dark pterothorax and abdomen and usually have yellowish-green markings. They range in size from 29-52 mm. Males have metafemora that have short stout spines proximally directed – this is similar to other genera. Many times the hindwings are not broadened at base. *Macrothemis* inhabit streams with sandy banks with rocks or boulders in forest clearings or low brush and can be seen hovering through regular courses. (Garrison, 2006)



Figure 4. Male *Macrothemis*. Pterothorax with green markings against dark color. Wings lack color and abdomen is generally dark. This genus was found at ATREC Bee Pond during morning hours.

Genus *Micrathyria*

Micrathyria spp. are smaller in nature (24-41 mm) and can be easily identified by turquoise eyes when alive. Thorax and abdomen usually characterized by pale yellow, green or light blue markings on black. Wings are sometimes tinged with coloration of brown to amber throughout entire surface. The Msp1 region in both front and hind wings is indistinct. The seventh through ninth abdominal segment can sometimes be widened and flattened. Males perch in vegetation around water's edge while females are generally found on vegetation away from the water. (Garrison, 2006)



Figure 5. Male *Micrathyria*. Abdomen slightly widened at end and a slight blue ting throughout. Pterothorax dark in color with some blue markings. Base of wings slightly tinged with brown coloration.

Genus *Orthemis*

Orthemis has no known unique characters and according to some references is in a dire need of revision. Many adults are identified by their large size (45-55 mm) and can be orange, red, or dark colored. A brown to metallic blue or violet postfrons and vertex can also be used for identification. Wings of *Orthemis* spp. may also have dark coloration around the nodus and at the wing tips of both the fore and hind wings. Habitats of *Orthemis* include environments that do provide large amounts of water such as ditches, small ponds, or even puddles. Males are territorial perches and guard the ovipositing female. (Garrison, 2006)



Figures 6 and 7. Male (top) and female (bottom) *Orthemis*. Top specimen has very dark thorax and face. Wings, both fore and hind wings have large dark spots of color. Female specimen has golden yellow pterothorax with some green markings. Abdomens are always yellow in females, sometimes green in males. Wing tinged with color on tips and near bases of wings.

Suborder Zygoptera

Damselflies have a dumbbell-shaped head with eyes widely separated. Both pairs of wings are similar in shape and size and in some families are stalked at the base. Damselflies are also much smaller than their larger dragonfly relatives. Zygopterans also hold their wings together when at rest and can be seen flying closer to the water. (Garrison, 2006) Females of the suborder have an ovipositor which may make the abdomen appear swollen

Family Coenagrionidae

Coenagrionids like most damselflies are sexually dimorphic with the males being brighter in color than the females. Many species are colored with blues, yellows, reds, oranges, or greens with contrasting black markings (Triplehorn, 2005).

Genus *Argia*

Argia are mostly found in streams. The wings can be completely clear to colored (Triplehorn, 2005). Tibial spines in *Argia* are generally twice the length of the intervening spaces. Wings are almost as long as abdominal length and the M1a vein extends at least 8 cell lengths. (Merritt, 2008) This genus is generally larger in size than other genera. The two species found in Dominica are blue striped or black and yellow striped.



Figure 8. A female *Argia*. Pterothorax is black with bold yellow stripes. Abdomen slightly lighter at base. Interocular area also with bold yellow markings. The two species in Dominica are found around Checkhall River and Middleham Falls.

Genus *Enallagma*

The genus *Enallagma*, also known as Bluets, are generally light blue to green. Around the same pond or lake, several different species can be found (Triplehorn, 2005). Wings in *Enallagma* are generally about three-fourths the length of the abdomen and no longer. The M2 vein arises near the 5th postnodal crossvein in the fore wing and near the 4th in the hind wing. (Merritt, 2008)



Figure 9. A male *Enallagma*. Pterothorax is green with dark markings. Abdomen is golden yellow underneath with a darker color dorsally, with tip having light blue marking. Many species can be seen inhabiting ATREC Bee Pond. The fly close to the water, perching on submerged vegetation.

Genus *Ischnura*

Females and males of this genus rarely look similar. Males usually have green stripes on thorax with a blue tipped abdomen. Newly emerged females are generally orange with black markings but when they mature they are a bluish green with faint dark markings. (Triplehorn, 2005)



Figure 10. A female *Ischnura*. Pterothorax is red-orange with large black marking. Abdomen is dark in color. Wings are approximately three-fourths length of abdomen and lack coloration. Genus can be found near ATREC Bee Pond.

Discussion

Although several collection sites were visited during this study, many other freshwater systems were unable to be visited due to time and weather constraints. Odonates are less likely to fly on rainy, cold days. A few of the set days for collecting resulted in no specimens due to this issue. Adults can also be found further away from water sources as seen in the Cabrits National Park example. The nymphs require water during the early stages of life but adults do not rely on water in the same way. To find adults, areas further away from water sources may need to be investigated.

In order to encompass all of the genera found on Dominica, future studies should be implemented at some of the sites already surveyed and other possible aquatic habitats around the island. Studies may also be conducted based around other factors, such as weather or time of day. It was discovered in this study that some species preferred direct sunlight in the morning hours, rather than the later afternoon hours when the sun was not as high.

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