# Survey of the Breeding Habitats of Mosquitoes at Springfield Research Station,

# Dominica

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Dominica 2005

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**Abstract:**

Mosquito larvae were collected from different stagnant water sources at the Springfield Research Station in Dominica. The larvae were raised to adults for identification. Two species of mosquitoes were identified: *Aedes buskii* and *Aedes aegypti*, and a third species,not yet identified, was also reared.

**Introduction:**

There are three broad categories of breeding habitats for mosquitoes. They are permanent water, temporary pool and artificial container. Artificial containers can be trash, tree holes, coconuts, bromeliads, rock holes or fallen leaves (Olson, 2003). The control mechanism depends on the type of habitat the mosquitoes are using for depositing eggs. I want to see which species of mosquitoes are breeding in the types of water habitats at Springfield.

Two common mosquitoes in Dominica are *Aedes aegypti* and *Aedes buskii*. Both mosquitoes breed in artificial containers. *Aedes aegypti* is a floodwater mosquito. The female will lay her eggs on damp soil in artificial containers. The eggs can resist desiccation for up to a year. In a warm, wet climate *Aedes aegypti* can be active all year around. This species is abundant in urban areas due to the amount of

breeding sites. *Aedes aegypti* is a primary vector for dengue and yellow fever (Womack, 1993). *Aedes buskii* larvae can be found in tree holes, bamboo, fallen leaves and in Heliconia flowers. It is found only in the Lesser Antilles. This species does not bite man and is not known to cause disease. The adult can reach high numbers and become a pest for domestic animals (Berlin, 1969). *Aedes* mosquitoes are easy to identify relative to other mosquitoes because of the pointed abdomen and basally pale scales on the dorsal segments of its abdomen (Stojanovich).

**Methods and Materials:**

Samples of mosquito larvae were taken at Springfield Research Station, Dominica from May 28, 2005 to June 1, 2005. The mosquitoes were reared to adults in a plastic rearing container. The adult mosquitoes were then killed and identified.

To collect mosquito samples, a turkey baster was used to extract water from various sources that harbored mosquito larvae. This water was put in a plastic bag for transport to the laboratory. Once in the laboratory, the water was transferred to a plastic rearing container that had an inverted funnel separating the chamber into two halves. The larvae were raised to adults in this container. Every other day the larvae were fed with a few drops of a fish food-water mixture with a dropper. The larvae matured into pupae, then into adult mosquitoes. The mosquitoes would fly up from the water through the narrow end of the funnel and collect in the top half of the rearing container. Mosquitoes were removed by unscrewing the top half of the container and they were then killed by exposure to filter paper soaked in ethyl acetate. The dead mosquitoes were placed on a petri dish for identification. The bottom of the petri dish contained a wet piece of paper. The mosquitoes

were identified with a dissection scope and subsequently placed in glass vials filled with 95% ethyl alcohol. A black permanent marker was used to label each vial.

**Results:**

Table 1 shows all the mosquitoes collected from May 28 to June 1. More mosquitoes were found in the natural containers of fallen leaves than in the trash left by humans. The mosquitoes preferred water that was see-through with a little vegetative matter.

*Aedes aegypti* is most easily recognized by its silvery lyre-shaped marking on its mesonotum. Its proboscis is entirely black. The hind tarsus has pale bands (Stojanovich). *Aedes buskii* can be differentiated from other species of the subgenus Howardina by the markings on its mesonotum. The silvery lines on its mesonotum are broken up into segments. The hind tarsus has pale bands (Berlin, 1969). I was not able to identify the unknown present in one of the palm leaf sheathes and in the plastic cup. I looked for many days on the Internet. It does not resemble any well-known genus in my keys. The unknown is speckled with gold and purple scales. The majority of its body is gold. It has sapphire blue scales on the back of its head and on the beginning of its mesonotum. Blue scales are on the underside of the slightly upward turn of the proboscis.

The permanent water sources I sampled for mosquito larvae were the pond on Mount Joy and the creek by the stream house. There were no mosquito larvae in either of these water sources. Both of these water sources were relatively still but not stagnant. The pond also had many minnows which will eat mosquito larvae. I also sampled other artificial containers which were the coconut shells and Heliconia flowers but I did not find any larvae.

The first mosquito larvae that grew to adults were *Aedes buskii*. Many of these were present before the unknowns became adults in the first palm leaf sheath. The unknowns in the plastic cup became adults the same day as the unknowns in the first palm leaf sheath. The *Aedes aegypti* in the pipe, tire and the second palm leaf sheath were the last to develop into adults.

**Discussion**:

All the mosquitoes sampled at Springfield were artificial container breeders. There was an abundance of palm leaf sheathes on the ground for the water to collect. The mosquitoes also used the trash on the ground. I expected to find mosquito larvae in the coconut shells and in the heliconias but there were none. This may be because the rainy season just began and there was no water in them until recently.

I had trouble finding mosquito larvae before it began to rain. There were many containers for mosquitoes but there was no water in any of them. I finally found some mosquito larvae in a palm leaf sheathes. I did not find any *Aedes aegypti* before the rain. After it rained, I mostly collected *Aedes aegypti*. The eggs were most likely deposited before it began to rain in the artificial containers. The water accumulating in these containers stimulated the eggs to hatch. From this observation, it seems that *Aedes aegypti* may not be common during the dry season but common during the rainy season.

Since mosquitoes can cause disease and discomfort it is best to reduce their numbers. The best control method is source reduction which is removing the mosquitoes' breeding sites (Kramer, 1996). Since the most popular breeding sites at Springfield are the leaf sheathes of the palms, the plant debris should be removed before they are allowed to collect water. The trash (cups, tires, pipes, ect.) should also be

picked off the ground. If getting rid of the plant wastes and trash is not possible, they can also be treated with larvacides. Methroprene is the most effective, lasting up to eleven weeks, but it is expensive. For less expense, *Bacillus thuringiensis israelensis* granules can be used but they should be applied as frequently as every seven days. Mineral oils can be applied to the water, which will cause the larvae and pupae to drown (Kramer, 1996). Larvae also have a natural predator that is used to control their numbers: *Toxorhynchites* larvae eat the larvae of other mosquitoes and the adults feed on nectar (Olson, 2003).

Overall, this project was mostly a success despite not being able to identify one of the mosquito species. I was able to identify the breeding habitats of the mosquitoes at Springfield Research Station. I really enjoyed watching the mosquitoes grow from larvae to adults.

**Acknowledgements:**

I would like to thank Dr. Wharton and Dr. Cognato for allowing me to experience a beautiful and exciting place. I also want to thank Dr. Olsen for loaning me his equipment and giving me the knowledge to complete this project and Dr. Woolley for the information on mosquitoes from 2002.

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Table 1. Identification of adult mosquito specimens reared from various water sources at Springfield Plantation, Dominica.

| Source | Date collected | Mosquito species | Water quality |
|---|---|---|---|
| Leaf sheathes of Royal and Coconut palm trees | 05/28/2005 | *Aedes buskii* (19 adults)<br>Unknown (24 adults) | Dirty water with decomposing vegetative matter |
| Plastic cup | 06/01/2005 | Unknown (4 adults) | Clean water with a few leaves |
| Pipe | 06/01/2005 | *Aedes aegypti* (4 adults) | Clear water with plant debris and dirt |
| Tire | 06/01/2005 | *Aedes aegypti* (3 adults) | Dirty black water with decomposing vegetative matter |

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| Leaf sheathes of Royal and Coconut palm trees | 05/28/2005 | *Aedes aegypti* (17 adults) | Yellow water with little vegetative matter, smelled of sulfur |