



Mosquito Biodiversity Across Long Beach

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Introduction

What is the diversity of mosquitoes present on Long Beach Island?

There has been anecdotal evidence that there are disease carrying mosquitoes as well as new, invasive species that are resident on Long Beach Island. Some mosquitoes carry infectious diseases such as West Nile Virus, O'nyong-Nyong, and the Zika virus. During August of 2018, temperatures in the city reached up to 90 degrees and there were numerous rain showers. These conditions were optimal for mosquito breeding.

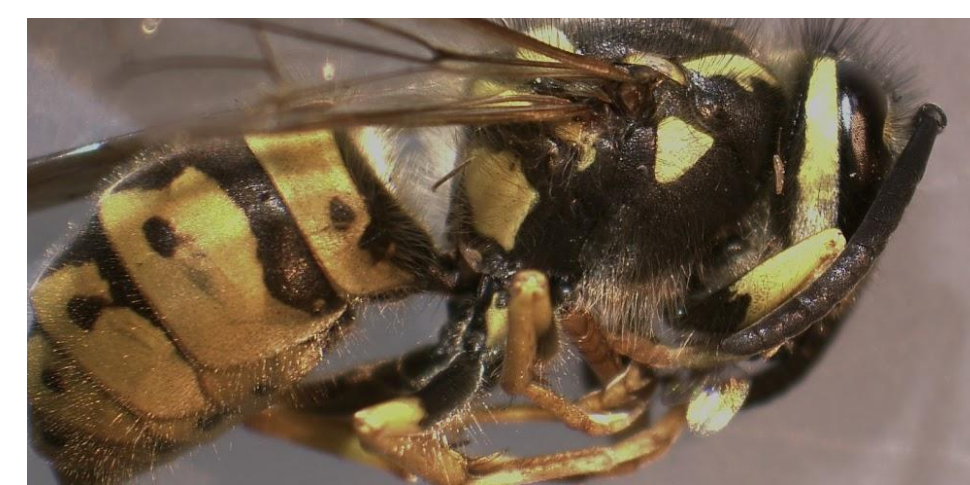
Materials & Methods

Traps

To catch the mosquitoes, homemade traps were made and a commercial Sentinel trap was used. The homemade traps were constructed using a recycled 2 liter plastic bottle, string, and duct tape. Inside of the bottle were yeast and a sugar water solution. Yeast were used because they perform fermentation and produce carbon dioxide. Carbon dioxide is known to attract mosquitoes. Sugar water was added as a food source for the yeast.

Barcoding Process

Despite the fact that four samples were successfully barcoded, only one came back with a match.



Vespula maculifrons



Drosophila melanogaster



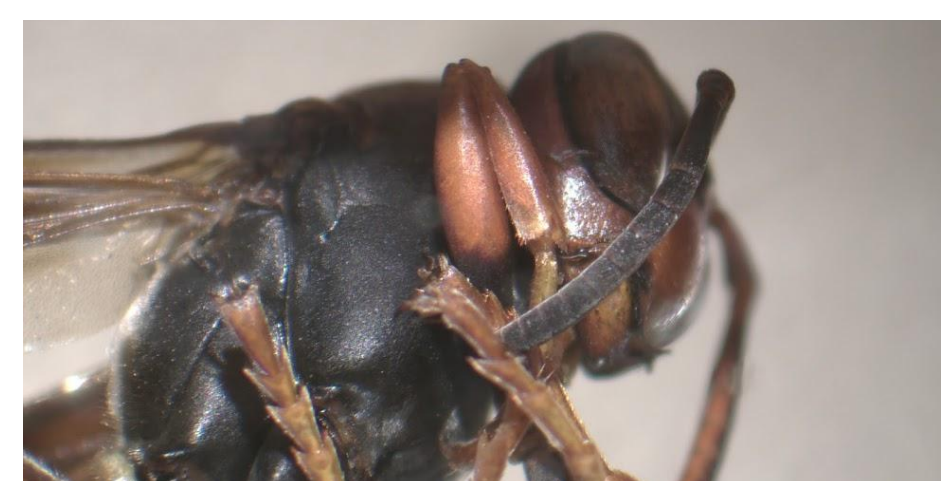
Homemade mosquito trap



Empis livida



Musca domestica



Polistes carolina



Aedes albopictus



Aedes communis

Results

While collecting organisms, the traps captured 15 mosquitoes (many of which were different species) as well as 15 other types of insects. Many of the other types of insects were flying insects. It is believed that these other insects were attracted to the carbon dioxide (CO₂) produced by the yeast and/or the sugar water that was used. These insects included yellow jackets, a wasp, fruit flies, crane flies, as well as many other species.

When the barcoding results of four of the samples came back, they were inconclusive. Although there were some possibilities listed, it was quickly determined that the organisms were not those. These samples have been sent to a lab to be further examined and to determine if their species hasn't yet been published to the database, or if they're newly discovered.

Inland Floodwater Mosquito (*Aedes vexans*)

Aedes vexans are mainly found in Europe, Asia, Africa and the East coast of the United States. Males predominantly use nectar as a source of nutrients, but females will consume blood before they lay their eggs. Blood supplies both protein and nutrients. Most of the protein in blood come in the form of hemoglobin (the protein that makes blood red and carries gases). The nutrients that are also present in blood are usually the nutrients that the animal gets from its prey. *Aedes vexans* are known to cause Zika, a mosquito-borne flavivirus that can cause symptoms such as fever, rash, conjunctivitis, muscle and joint pain, malaise and headaches. In pregnant women, Zika can cause the baby to be born with microcephaly, or and other congenital malformations, known as congenital Zika syndrome. Infection with Zika virus is also associated with other complications of pregnancy including preterm birth and miscarriage.



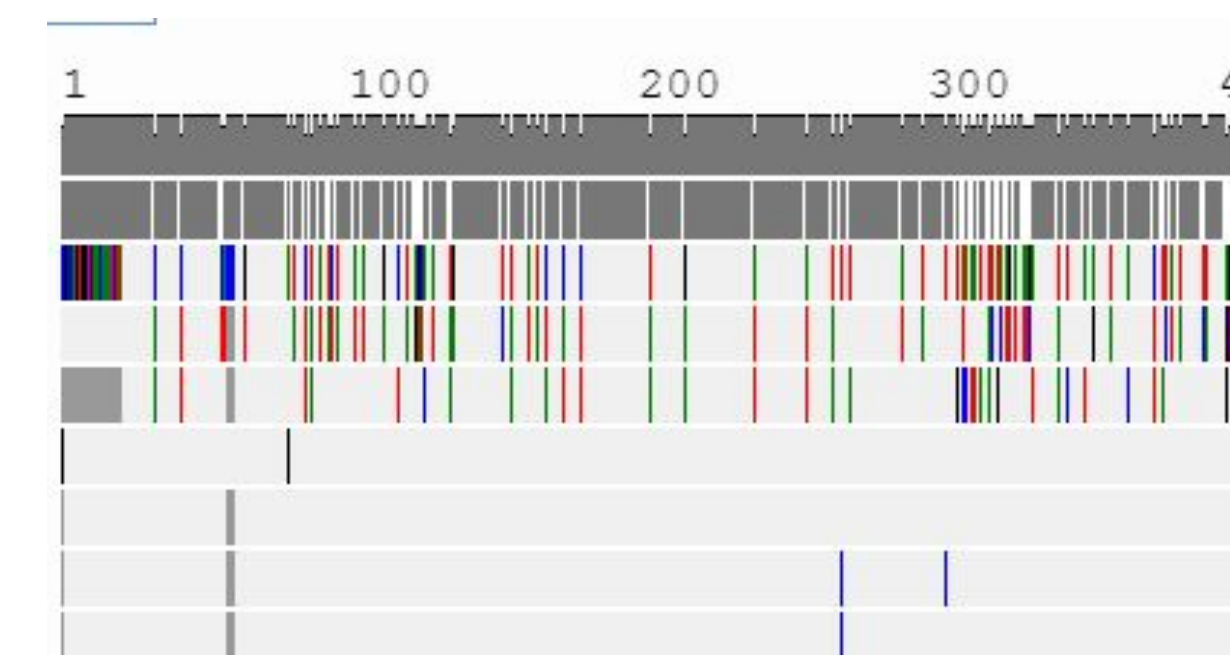
Distribution of *Aedes vexans* across North America

#	Accession #	Details	Aln. Length	BL Score	q #	Mis-matches
1(1)	KP954638.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> isolate THCG121313THCO1 cytochrome oxidase subunit 1 (COI) gene, partial cds	684	1198	0.0	8
2(2)	HG279152.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG-CAND-TDNG-0841 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1173	0.0	3
3(3)	KT117768.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG1515-002 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1173	0.0	3
4(4)	KT116181.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG1364-F02 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1173	0.0	3
5(5)	KT113440.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG1515-A06 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1173	0.0	3
6(6)	KR27145.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG1640-C11 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1173	0.0	3
7(7)	MG24252.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> cytochrome oxidase subunit 1 (COI) gene, partial cds	674	1171	0.0	10
8(8)	HG277776.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher BIOUG-CAND-TDNG-0238 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1169	0.0	4
9(9)	MF265664.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> isolate SS-Ae-ve1 cytochrome oxidase subunit 1 (COI) gene, partial cds	658	1169	0.0	4
10(10)	KR438026.1	<i>Aedes vexans</i> - <i>Aedes vexans</i> voucher K08CHY-2763 cytochrome oxidase subunit 1(COI) gene, partial cds	658	1169	0.0	4

Barcoding *Aedes vexans*



Aedes vexans



Examination of polymorphisms