Survey of Mosquitoes on Lake Houston and Surrounding Houston Areas

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Abstract: After a move from a suburb in the Houston area to Lake Houston (Northeast of downtown Houston), it was observed that the mosquitoes during the summer seemed to be much more prominent on Lake Houston than previously in the suburb. This noticeable difference triggered the question of what types of mosquitoes preferred what kinds of locations and why. To understand and evaluate this question, a survey of various mosquito types across the Houston metropolitan areas was performed. Traps were set up in five cities of different environments, mainly varying in their proximity to specific environmental differences (i.e., lakes, woody areas, downtown etc.) Mosquitoes were collected over a weekend in April, a month reported to have one of the highest rates of mosquitoes present (Nava, 2016). Through research, it was determined that the most prevalent mosquito types in all the Houston area were *Culex* species, *Anopheles* species and *Aedes* species. Each of this mosquito types have been reported in high numbers during the late Spring and Summer months in all of Houston, but there is little data on how each type is distributed in each area. Through the research, it was hypothesized that Anopheles species would be most prevalent in areas near water and was upheld by the data from the experiment. Knowing this information about the prevalence of certain types of mosquitoes in each area can better help create a mechanism for trapping in each place. Each types of mosquitoes are drawn to various things, for instance, Anopheles prefer to stay on standing water and knowing these preferences can be applied to a better prevention (Mosquito World). With the rise of many serious mosquito transmitted diseases like Zika and West Nile, knowing specifically what mosquitoes are in which area are helpful to each community in protecting themselves from these threats that are associated with each mosquito type.

Keywords: Houston, mosquitoes, Aedes, Anopheles, field-survey

Introduction

A pestering Houston issue known to anyone living in the area is the amount of unwanted mosquitoes in the late spring and summer months. After moving to Lake Houston from a suburban area, it was noticed that the number of mosquitoes was significantly higher, and after a bite, the welts that emerged were much different than from the suburban areas. To analyze this observation, a survey of mosquito types was done in Humble on Lake Houston, Cypress, downtown Houston, Sugar Land and their different environments in order to see if different types of mosquitoes in a small geographical area preferred certain

environments. After doing research on the mosquito types common to Houston, it was hypothesized that *Anopheles* species would be more prominent in humid areas close to water, and *Aedes* would be more prominent in areas that were more urban and populated.

Material and Methods

To perform a survey for types of mosquitoes in various Houston areas, homemade mosquito traps were placed in the backyard of experimenter's friends' homes for one weekend in April. To create the mosquito traps, five 2-liter bottles were obtained. The bottles were cut in half, and the end with the bottle funnel was placed upside down in another bottom half of the 2-liter. The pieces were taped together using and then wrapped completely in duct tape, leaving the top open. A solution was prepared by heating equal parts water and brown sugar together. Once the water and brown sugar was cooled, it was poured into each trap through the upside-down funnel. One gram of dry yeast was sprinkled on top of each, but not mixed, to create carbon dioxide in the traps. The locations chosen for traps were Cypress, Sugarland, Pearland, Humble and downtown Houston. One trap for each location was created, and then placed in the backyards of a home in each area at 4:00pm. The traps were left until the following Sunday afternoon (meaning they were left for a week) and the specimen were collected at 4:00pm. Each specimen collection was placed in its own Ziplock bag and brought back to campus to be analyzed by microscope to identify the genus. The genus was determined using keys from Entomology 423 lab manual. The results from each location and time are seen in Table 1 below.

Results

Location:	Description of Location:	Date trap was placed	Date specimen collected	*Anopheles*	*Culex*	*Aedes*	*Unknown*
Atascocita, TX on Lake Houston	Trap placed near lake side, in grassy area	3/21/17	3/23/17	8	5	7	2
Cypress	Trap placed in back yard, no stagnant water in vicinity was noted, many trees in area	3/21/17	3/23/17	2	1	5	0
Downtown Houston	Trap placed in courtyard of apartment complex, grassy area but no trees, sewers in area (possible places with stagnant water)	3/21/17	3/23/17	0	1	5	0
Sugarland	Trap placed in soil of back yard near flower garden, a few trees in area, pond about a mile away	3/21/17	3/23/17	4	2	8	1
Pearland	Trap placed in wooded area, not near many	3/21/17	3/23/17	3	2	4	0

Figure 1: Data collection of specimens

Figure 2: Map of trap locations

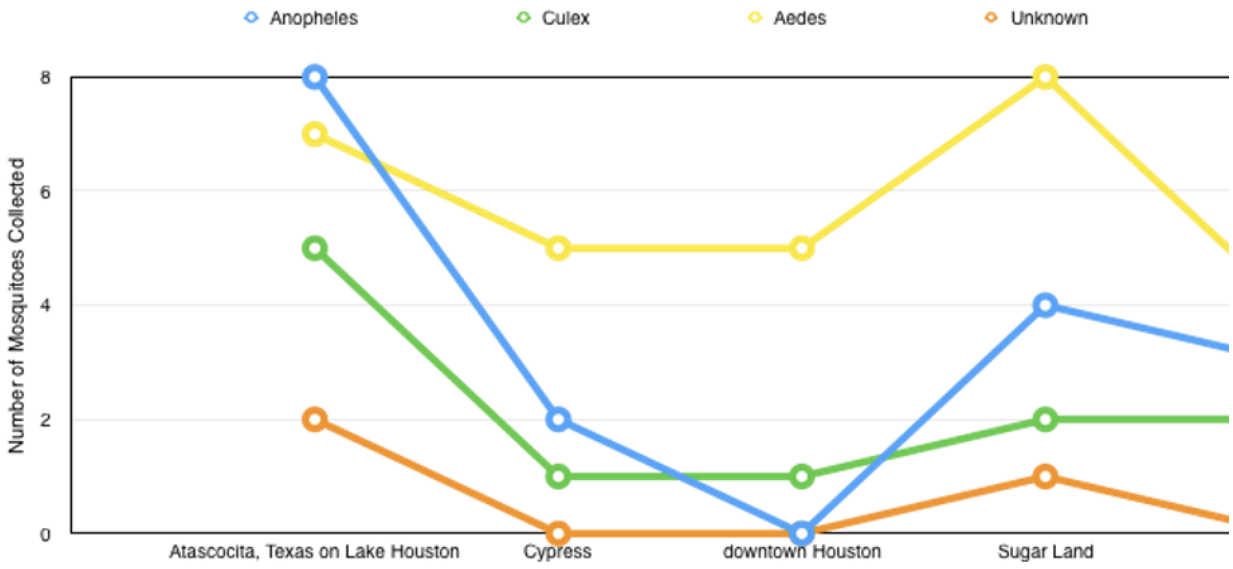

Figure 3: Representation of specimens

Discussion

From the data it was found that in the location nearest to a large body of water (Atascocita, TX on Lake Houston) the highest number of mosquitoes were collected. The genus collected in the highest number there was the Anopheles mosquito.

This result was supported by further research, as Anopheles mosquitoes are "permanent water mosquitoes" (Nava, 2016).

This means that they lay their eggs in clumps which can survive in larger, more permanent bodies of water such as lakes and ponds. Culex mosquitoes are also permanent

water mosquitoes, and the highest number of Culex found was at Lake Houston (Mosquitoes of Houston). It was interesting to note that while that Anopheles were the most common genus collected from the Lake Houston location, an almost equal number of Aedes mosquitoes were also found there. This was interesting as Aedes mosquitoes are known as "floodwater mosquitoes," because they tend to lay their eggs in less permanent water pools, such as floodwater from heavy rains (Mosquito World). This is most likely due to the rainfall experienced the week before the traps were laid, because this would increase the number of floodwater pools where the Aedes mosquitoes could breed.

It is worth noting that this data while very informative it needs to be expanded upon, as only one trap was set up at each location and specimen were collected for one week only. This means that the data cannot be used as conclusive population density predictors for the entire areas around the locations. What this data does inform upon is ranges for the various mosquito genera. If another study were to be undertaken using more traps in different spots at each location could give more accurate indicators of the population densities of each mosquito genus.

It seemed that the overall trend found in the locations was that the Aedes genus was the most common mosquito genus in these areas. This is most likely due to Houston's (and the surrounding areas) climate, which is very hot, humid, and includes high amounts of heavy rainfalls (Champion, 2014). A surprising trend was that Aedes was also common in downtown Houston, and at first it was hard to find suitable locations where these mosquitoes might have bred (Roberts, 1997). However, upon further investigation of a 2-mile radius to where the trap was placed, multiple stagnant water pools were found near sidewalks and would provide a likely habitat for the Aedes females to lay their eggs.

It is important to know which mosquitoes are present within different areas because different mosquito species are responsible for different vector borne diseases. The Anopheles mosquito is the vector for malaria (Carrasco, 2012). While technically malaria was eradicated from the U.S. in the 1950s, there have been numerous outbreaks since then which occur when an infected person enters the U.S. and is fed on by an Anopheles and that Anopheles then goes on to infect other people (Mosquito Borne Disease). Should an outbreak occur, it would be important to know where Anopheles are more commonly found so that people are able to take the correct preventative measures. Aedes are prominent vectors of many diseases including but not limited to yellow fever, West Nile fever, chikungunya, eastern equine encephalitis, and Zika virus (Rios, 2006). Avoiding having stagnant water around yards and in neighborhoods is a good way to limit the population of Aedes mosquitoes (W. L., 2007). People should also use mosquito spray when spending days outside, because almost every genus of mosquito was found at each location (except for Anopheles which was not collected in downtown Houston) meaning that there is always the possibility of being bitten. Overall, Houston and the areas surrounding it are home to many types of mosquitoes.

With its warm, humid climate and frequent rainfall Houston is a perfect location for both floodwater and permanent water mosquitoes. The nearness to permanent bodies of water seemed to be the most distinguishing factor for the different locations, and consequently the presence of these water bodies correlated with having a higher number of permanent water mosquitoes (the Culex and Anopheles). The Aedes mosquitoes were present in high numbers (comparatively) almost everywhere, which was not surprising as Houston is the prime location for many floodwater mosquito species.

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