Study of *Guinotia dentata* Movements Relating to Water Sources and Burrows

John Harling UIN: 124008691

Texas A&M Dominica Study Abroad Trip

May-June 2017

Abstract

Dominica is home to a large and diverse collection of wildlife, and one crucial player within Dominica's ecosystems is the crab *Guinotia dentata*, more commonly known as the cyrique crab. The goal of this study is to describe the cyrique crab's movements when it comes to habitat choice regarding their shelter. In order to observe this, the crabs were temporarily removed from their habitat and then returned to the wild, at which point their movements could be recorded. Seven crabs were tested in total and overall, the results on the movements of crabs are not very predictable. The one crab that was caught near its burrow did return to its own burrow and the one crab released at a different water source did not go to the new water source, but one crab is not enough data to confirm this. The two crabs released near the water where they were caught, Crab 1 and Crab 3, went straight to the water. Lastly, the rest of the crabs, which were released inland from the water, did not consistently go back to that same water source.

Introduction

This study focuses on *Guinotia dentata*, also known as Cyrique, and it has a broad carapace that has a brown and yellow color with black corneas. It can be found close to the Archbold Tropical Research and Education Center (ATREC), which is located at N 15^0 20.805' and W 061^0 22.050', in Dominica at night (Venable, 2004). It is a West Indian species that can only be found in St. Vincent, St. Lucia, Guadeloupe, Martinique and Dominica (Anne & Pierre, 2014). This makes it a unique species to study, and research on it could shed light on the inner

workings of the ecosystems within Dominica. The cyrique is a freshwater crab and the only one on Dominica that completes its full lifecycle near freshwater (Chace & Hobbes, 1969). The cyrique crab burrows are always near a source of flowing freshwater. This includes being near streams, seepage areas, and rivers such as the Check Hall River. They tend to use rocks and dirt as protection when forming their burrows. I devoted time to catching the crabs at night, especially after heavy rain, because that is when they will leave their burrows (Miculka, 2009). This preliminary study can lead students on future Dominica study abroad trips to study the cyrique crab and as a result, it can create a more complete collection of data for *Guinotia dentata*. Studying the movements of these crabs near their home ranges can give people a better understanding of their role in the Dominican ecosystem and the role they play in maintaining it.

Figure 1: Crab 7 Climbing a Tree

Methods

Guinotia dentata will usually be found either underwater or in moist areas near water so the locations of this study are restricted to areas that fit that description. The specific

location of this study included the areas near ATREC in Dominica that contain running water. All of the cyrique crabs were either caught in the Check Hall River or near the smaller stream uphill from the Check Hall that the trail crosses as it goes back up towards ATREC.

Capturing the crabs required a pair of leather gloves for protection from the claws of crabs, a headlamp with red and white light to locate crabs at night, two handheld fishing nets to catch crabs in water, and one large net to transport the crab from the capture sight to the less transportable bucket with the crab habitat inside. The materials used when releasing the crabs include a bamboo stake to hold the spool of string in place. The spool of string used to track the crabs was jean string. Tissue adhesive glue, repositionable glue, and multiple pieces of plastic smaller than the cyrique crab's carapace were used to attach the string to the crabs so that they could be tracked. One multi-tool with a knife and scissors was used as well to cut string and plastic.

In order to capture the crabs, two methods were used. The first option was to catch a crab by surprise while it is outside but near its' burrow or a water source. First, the crab was approached very slowly with a net and a red light, then the crab was put in the net before it had time to escape. This was quite rarely successful and it only worked twice. The second option, as well as the most successful and reliable method, of capturing crabs was capturing them while they are in the water of the Check Hall River. The river was scanned until a cyrique crab was spotted in the water. Then the crab was scooped up with handheld fishing nets and transported to the bucket with a larger net. This is how 5 of the 7 crabs were caught.

Once a crab was captured, they were kept captive for approximately 24 hours. A thin layer of dirt was placed into a bucket which was .36 meters in diameter and .3 meters tall. It must be large enough to where the captured crab with its two arms with claws extended is still shorter

than the bucket's length. Leaves from the forest floor were also added to make it more similar to their environment. Water was added until all of the dirt was moist. The crab was put inside the bucket, along with some food, which included bread, coconut, mango, and sardines, for it to eat. Wire mesh was placed over the top of the bucket to prevent escape and rocks were put on top of that for security. Duct tape was taped along the sides of the bucket and the wire mesh as a backup for the rocks. The complete crab habitat, with a crab inside it, was left in a dark section of the wet lab of ATREC for approximately 24 hours to prevent predation.

There were multiple forms of releasing the crabs. The first three crabs were all released near where they were captured. After the 24 hours of captivity had past, the spool of string was placed over a bamboo stake in the ground 4.5 meters from the capture sight and a piece of plastic smaller than the crab's carapace was attached to the end of the string. Then a mixture of tissue adhesive glue and repositionable glue were squeezed onto the piece of plastic. The piece of plastic was then placed on the carapace of the crab with the glue side down touching the crab. Once it was secured to the crab, tissue adhesive glue was squeezed around the edges of the plastic in an attempt to get the edges flush with the carapace. The bucket was tipped on to its side and the crab was released. This had to do be done manually instead of preferably being far away because the crabs did not have any grip moving around on the sides of the smooth plastic bucket so they had to receive some help in order to exit the sideways bucket. When the crab was free, the movements that it made were observed until it was no longer visible. The 4 crabs left were released in slightly different locations from the previous three. One crab was released 4.5 meters away from a different water source than the one that it was captured in and three other crabs were released 9.1 meters inland from the spot where they were captured in the water. This distance varied slightly due to the inaccessibility of the inland side of the water because of the

incline of the terrain and the bamboo debris. Other than the location of release, these crabs were released in the same process as the first three crabs.

Results

Crab 1 was caught in the Check Hall River and was released the next day in the same area it was caught. It walked away sideways into the same pool of nearby water where it was captured (see Figure 3). It then proceeded to retreat underneath a rock where it was no longer visible. The string fell off as it went into the water because the string that was used had been cut and was not effectively repaired, therefore tracking it further was not possible.

Crab 2 was caught right outside its burrow which was on the edge of the stream on the trail that is uphill from Check Hall River and was released the next day in the same area as well. However, it was released an extra 2 meters away so that it would be off the trail and not in anyone's way as they walked down the trail. Once released, it started to walk across the trail towards the water but then followed the trail instead all the way back into its old burrow (see Figure 4). A different crab had moved into the burrow while this crab was gone but when the captured crab came back, the intruder then came to the entrance and tried to leave but slipped twice then gave up and went somewhere else in the burrow where I could no longer observe what happened. When the string was checked the day after it was released, the glue had worn off but the string was lying right in front of the burrow and the placement of the string had not changed position since the night before.

Crab 3 was caught in the Check Hall River and was released near the same place it was caught and it took the quickest path to the water which was not the exact spot it was captured in

(see Figure 5). The crab was sighted again later that day and it was in the same spot in the water that it entered under a rock, but the glue had worn off by the next day and the string had not moved.

Crab 4 was caught in the Check Hall River and was released near the stream uphill from the Check Hall River the next day. It walked down the path a little then walked into the woods in the opposite direction of the new water source (see Figure 6). It was going in the direction of Check Hall River but this site was too far away to conclude that it knew that is where it was headed, and the tracking string didn't make it that far because it got stuck and snapped off in the brush.

Crab 5 was caught in the Check Hall River and was released 6 meters inland from the site it was captured the next day. It moved parallel to the water and continued to do so until the tape came off which was about 4.6 meters away (see Figure 7).

Crab 6 was caught in the Check Hall River and was released the next day, 6 meters inland from its capture sight. It did not go towards the river. It instead walked away from the river and crossed the trail and then walked down the trail parallel to the river going downstream. It continued to do so for 25 meters until the trail was lost (see Figure 8).

Crab 7 was caught on the trail near the stream that is uphill from the Check Hall River and was released 6 meters inland from that stream the next day. It climbed a rock then climbed part way up a tree and stayed there for quite a while. When the crab was checked again that night, it had crawled down from the tree and was headed in the direction of the stream (see Figure 9).

Figure 2: Key for figures below

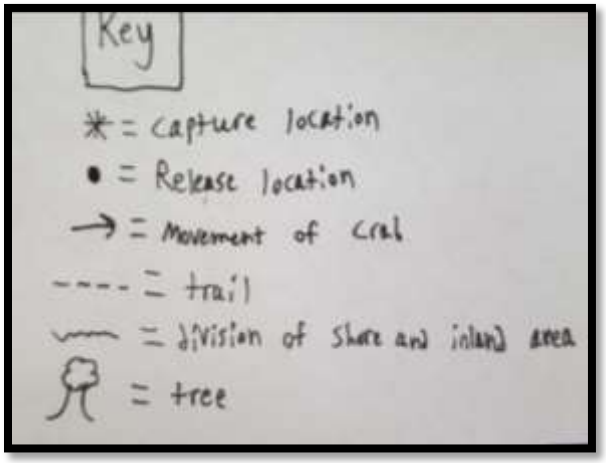


Figure 3: Movement of Crab 1

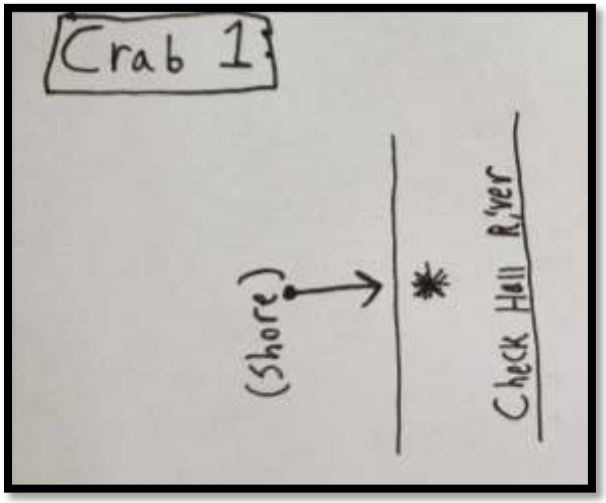


Figure 4: Movement of Crab 2

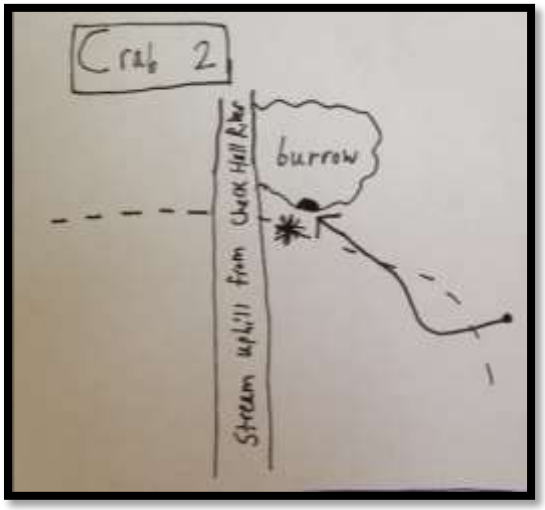


Figure 5: Movement of Crab 3

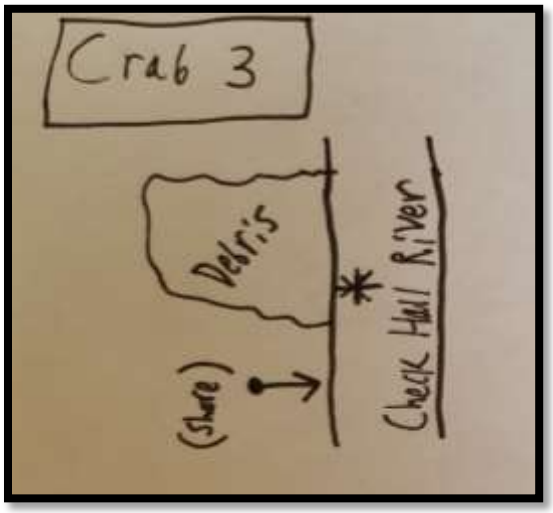


Figure 6: Movement of Crab 4

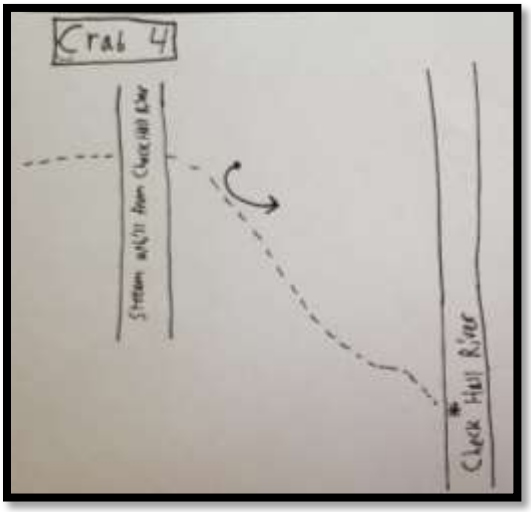


Figure 7: Movement of Crab 5

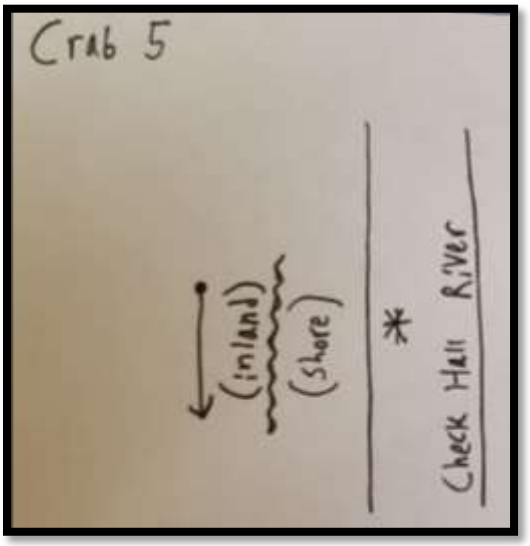


Figure 8: Movement of Crab 6

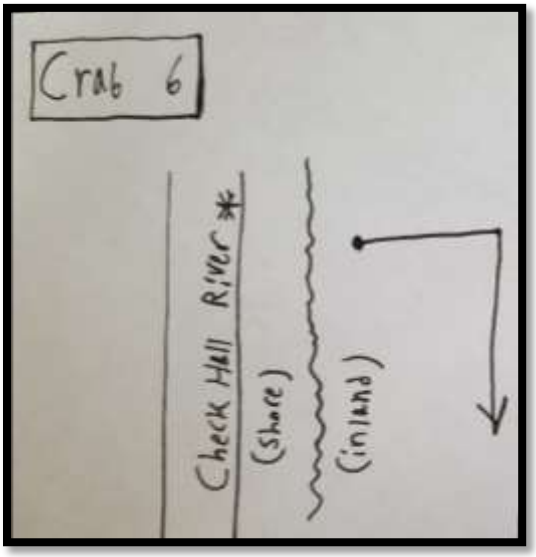
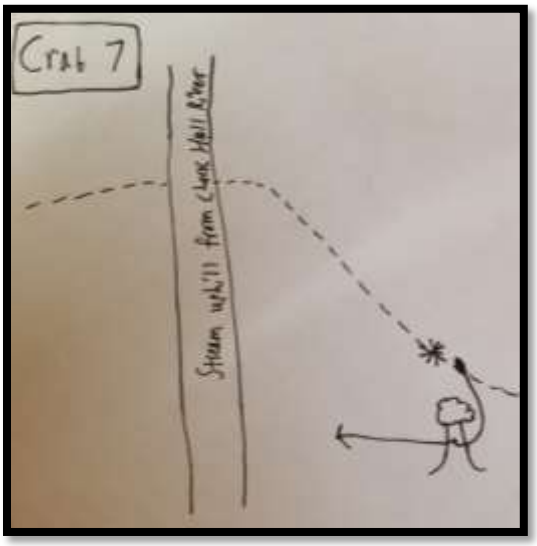


Figure 9: Movement of Crab 7



Discussion

The results were mostly inconclusive. Crab 2 was the only crab that was caught at the mouth of its burrow. It navigated back to the burrow and another crab had moved in which indicated that cyrique crabs can remember their burrows and that they will steal open burrows as well. Crabs 1 and 3 both immediately retreated into the water. Crab 4 was released at a different water source and when released chose not to go to the new water source, but instead started walking away from the water and went in the direction of where it was originally captured instead. The tracking string fell off before the crab was near enough to its original water source to confirm that is where it was going, so potential future studies could expand on this to see how developed the cyrique crab's mental mapping skills are. The first two crabs that were released inland did not go back to the water. They might have returned to the water later but the tracking string failed before this could be recorded. The third crab released in this manner first climbed part way up a tree and stayed there motionless (Figure 1). There are other recorded instances of different species of crabs that climb trees, such as *Aratus pisoni* (Warner, 1967). Although, more research would need to be done on *Guinotia dentata* to see if this is a consistent behavior in cyrique crabs or if this was just a random incident. Later, the string was checked and this crab had crawled down from the tree and was going in the direction of its water source but only one out of three crabs doing so is not consistent enough. The tracking string fell off the crabs much more than expected and this could be due to all the different adhesives used to attach the string to the crabs were not holding up well in moist and rainy conditions. One other possible error could be that the observer effect was changing the behavior of the crabs as they were released, even from a distance.

Acknowledgements

Thank you Dr. Lacher, Dr. Woolley, and Dr. Brundage for the guidance throughout this trip. Thank you to the A&M Study Abroad Program for making it possible for this project to be completed. Thank you to my fellow students for assisting me in carrying equipment and catching crabs.

Literature Cited

Chace Jr, Fenner A., Horton H. Hobbs Jr, 1969, *The Freshwater and Terrestrial Decapod Crustaceans of the West Indies with Special Reference to Dominica*, Smithsonian Institution Press, Washington, D.C., p.40

Miculka, Brian, "Burrowing Habits, Habitat Selections, and Behaviors of Four Common Dominican Land Crabs; *Guinotia dentata, Gecarcinus lateralis, Gecarcinus ruricola, and Cardisoma guanhumi*", 2009, http://bug.tamu.edu/dominica/student%20projects/Dominica%20Projects%20pdf%20copy/Miculka_Bryan.pdf

Prouzet, Anne , Noël, Pierre *in:* DORIS , 13/10/2014: *Guinotia dentata* (Latreille, 1825), http://doris.ffessm.fr/ref/specie/1197

Venable, Kristen, "Photographic Guide to the Freshwater and Terrestrial Crabs of Dominica", 2004, http://bug.tamu.edu/dominica/student%20projects/Dominica%20Projects%20pdf%20copy/Venable_Kristy.pdf

Warner, G. F. (1967), The life history of the mangrove tree crab, *Aratus pisoni*. Journal of Zoology, 153: 321–335. doi:10.1111/j.1469-7998.1967.tb04066.x