A Study of Location and Occupancy of *Gecarcinus ruricola* Burrows in Dominica

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Kingdom: Animalia
Phylum: Arthropoda
Class: Crustacean
Order: Decapoda
Family: Gecarcinidae
Genus: Gecarcinus
Species: ruricola

Abstract

Gecarcinus ruricola is the most commonly found crab of the Springfield Center for Environmental Protection, Research, and Education. This study focuses on the locations of the burrows formed by Dominican land crabs. Of two colonies examined, one was more densely populated than the other, and factors that may have led to these results were analyzed. Data on burrow depth and height of burrows on hillside colonies were tabulated and graphed.

Introduction

This study took place in the summer of 2001 on the island of Dominica located in the West Indies, and the study site was located at Springfield Estate. At least two species of Dominican land crabs occur in this area including the Black Land Crab, *Gecarcinus ruricola*, and *Gecarcinus lateralis*, locally known as Touloulou. The Black Land Crab has a dark purple to black dorsal surface with light orange to yellow claws and is frequently hunted for food. They are common up to 300 meters elevation. *Gecarcinus lateralis* is reddish brown in color and smaller than *Gecarcinus ruricola.* They are common beside rivers and streams also up to 300 meters elevation and are occasionally used as food (Evans and James, 1997). Both crabs burrow one to two feet into the slopes of hills (Chase and Hobbs, 1969). I chose to make a chart of the established crab holes I found on the path to the Check Hall River, and to determine which holes were occupied.

Materials and Methods

There are multiple sites where crab holes can be located at Springfield, including up the path to Mount Joy, along the trail to the large fig tree, and next to the Stream House. The area I chose to study was the path that leads to the Check Hall River. In the hillside just before the stream, more than twenty crab holes were found. I divided these burrows into two sample sites (colonies), separated from each other by about five meters. Observations were made on these crab holes every day from Wednesday May 30, 2001 until Sunday June 10, 2001. The crabs were most active just after rainfall and at night and could most easily be viewed in their holes at this time. Using numbered tagging ribbons, I marked each of the twenty holes by tying the ribbon to a stick and placing the stick into the ground above the hole. Next, I used the tape measure to determine the distance between each hole, the length of each colony (labeled A and B), and the distance from each colony to the water source. I also measured the depth of each hole using a narrow bamboo stick. It was difficult to be precise using this method due to possible turns in the holes, but most of them did not deviate from a straight path. The stick was then marked and measured, and the depth was recorded. I used the measurements to develop an accurate chart of the locations of burrows in each colony. On each trip I made to the crab burrows, I used a flashlight to view the crabs inside their holes. If I spotted one, I recorded the hole's number on the chart. The holes were deep enough so that a

crab could be present and not viewed so I also relied on other methods to determine if the burrows were occupied. I accomplished this by slicing a mango into twenty small pieces and leaving one at the entrance to each hole. They were baited in the evening and checked the next morning. If the mango was missing, this was recorded as a probable occupied hole. This process was then repeated another night with coconut as bait. Both tests were done on nights where rain was present and the crabs would be most likely to find the food. Different color finger nail polishes were used to record whether a crab was observed, the mango was taken, or the coconut was taken.

Results

The burrows tended to be located in clusters with only a few farther than a meter away from the next, and were located on the hillside from the base to just over a meter above the base. The hillside was heavily covered with leaf litter from palms and bamboo. Roots and large rocks were also present and made finding the holes on the hillside difficult. The only crab observed at this location was the Black Land Crab, *Gecarcinus ruricola*, although it is possible that *Gecarcinus lateralis* was also present. Colony A consisted of the first ten substantial burrows. Out of these ten, crabs were viewed in eight of the holes, mango was taken from three, and coconut from nine. This suggests that all ten of the burrows were most likely occupied. Colony B consisted of the next set of ten burrows. Of these, only one crab was spotted, mango was removed from one, and coconut from three. These results suggest that only three of the holes in Colony B are likely to be lived in. The holes in Colony A were farther from the water source between 15.24 - 20.12 meters distant (figure 1). Colony B was located 5.7 - 10.36 meters from the water. Another difference between the two colonies was the height from the base of the hillside. The average height for a burrow in colony A was 39.57 cm, and the average height for a burrow in colony B was 67.05 cm (figure 2). The mean depth of the holes also differed from colony A to colony B. Burrows in colony A were deeper with a mean depth of 40.51 cm. Colony B consisted of more shallow holes with an average depth of 27.68 cm (figure 3). Coconut seemed to be the preferred food of *Gecarcinus ruricola* as it was taken from twelve holes and the mango was only taken from four.

Discussion

Gecarcinus lateralis has not been extensively studied in the past, which leaves many interesting options for future projects. Unfortunately, relatively little can be accomplished without depending on rainfall. Under normal circumstances, there is heavy rainfall during the wet season and crabs are abundant on the paths (T. Lacher, pers. comm.). With the dry weather experienced this year, only a few were spotted. This left me to concentrate on studying crabs while they were in hiding. It was interesting to compare the differences in the two colonies and to determine why A was more heavily occupied than B. This could be due to the thicker leaf litter around colony A, which gave the crabs more coverage in which to hide, and the reduced height from the ground may have made those holes more accessable. Predation could also have an influence. Predators might be located closer to the water source which could be the reason colony A, which is farther than B, is more populated. The deeper holes in colony A could also make it more difficult for predators to catch them. I had planned to capture the crabs at the location of their holes and to observe whether they were able to return. I tried a variety of tactics to catch the crabs at their holes, but I was unsuccessful. My first attempt to remove them consisted of blocking the hole behind the crab with sticks and encouraging them to leave through the front. The crabs were not cooperative, and this only caused them to retreat farther back. My next attempt was somewhat more successful. I placed pieces of coconut at the holes' entrance to lure the crabs out. They were lured out as far as was necessary to grab the coconut, and then hurried back in their holes to enjoy their free meal. As a result of this, I tried tying the coconut to a stick with a piece of string. The crabs were able to remove the string. In another endeavor I constructed a small gate out of bamboo and string and placed it inside the burrow. The idea was to shut the gate behind the crab forcing it forward as the gate closed. Unfortunately, the gate was not sturdy enough, and the crab destroyed it. In a last effort to remove the crabs, Dr. Wharton and I decided to dig out the hole. We chose a hole in which a crab had been viewed every day. After two hours of digging we reached the back of the hole and no crab was found. The dry weather had an adverse affect on my project because the crabs are nocturnal and most active after rainfall. Due to the lack of rain, despite the fact that the study took place well into what was supposed to be the wet

season, the crabs remained hidden in their holes. As a result in my lack of success in capturing the crabs, I had to make an adjustment in the procedure of my project. Although I was not successful in capturing the crabs, I learned a great deal from my attempts. The crabs seemed determined to protect their homes from anything intruding including sticks and gloves. They would attempt to fight these items off until they realized that they could not, and then they would retreat far back into their holes. I also learned about the foods crabs will eat, especially coconut. After Dr. Wharton and I dug up crab hole number six and determined that it was empty, the previous occupant was found in hole number five which was directly next to it. The crab was identified because it had previously been marked. This suggests that *Gecarcinus lateralis* does return to the same hole or at least makes an attempt to do so. Another interesting observation was a relationship between the size of the crabs and the depth of the hole. The largest crab I observed was approximately 14 cm long across its carapace and resided in the deepest hole. The shallowest hole was the home of a very small crab. This would be an interesting topic to explore in future research. Also, there is a lack of information on identifying the crabs in Dominica, especially in the area of photographs. A guide to Dominican crabs would be very useful as many different species were seen in our trips to Cabrits, Roseau, Rodney's Rock, Emerald Pool, and the Checkhall River.

Acknowledgements

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Works Cited

1. Chase, Fenner A. JR & Hobbs, Horton H. JR . 1969 . The Freshwater and Terrestrial Crustaceans of the West Indies with Special Reference to Dominica . Smithsonian Institution Press, Washington DC .
2. Evans, Peter G.H. & James, Arlington . 1997 . Dominica Nature Island of the Caribbean Wildlife Checklists . Ministry of Tourism, Government Headquarters, Roseau, Commonwealth of Dominica .

Burrow Depth

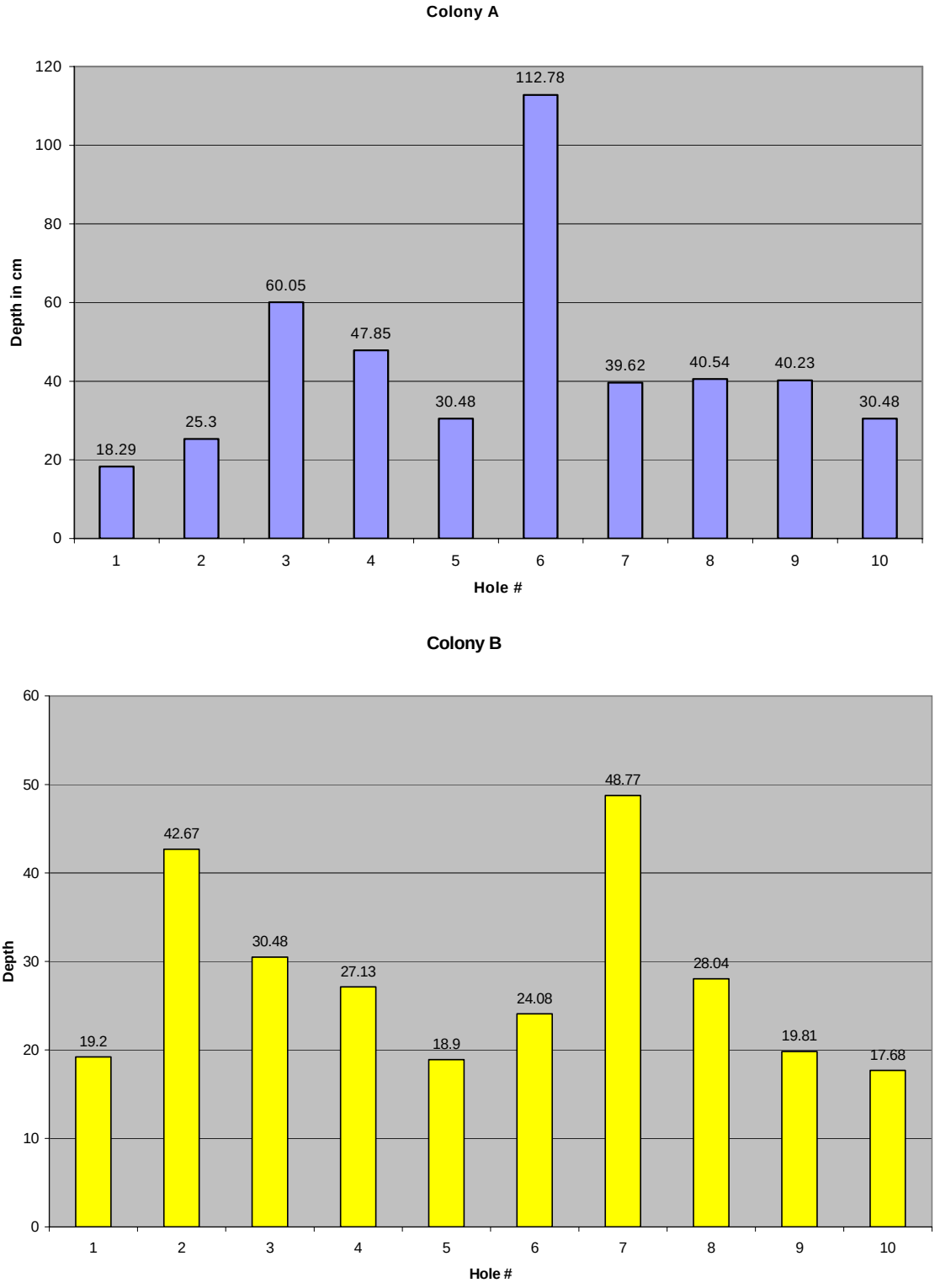

Figure 3: Burrow Depth – Colony A Mean: 40.51 cm, Median: 39.25 cm, Mode: 30.48 cm; Colony B Mean: 27.68 cm, Median: 25.61 cm, Mode: none

Burrow Height from Base of Hillside

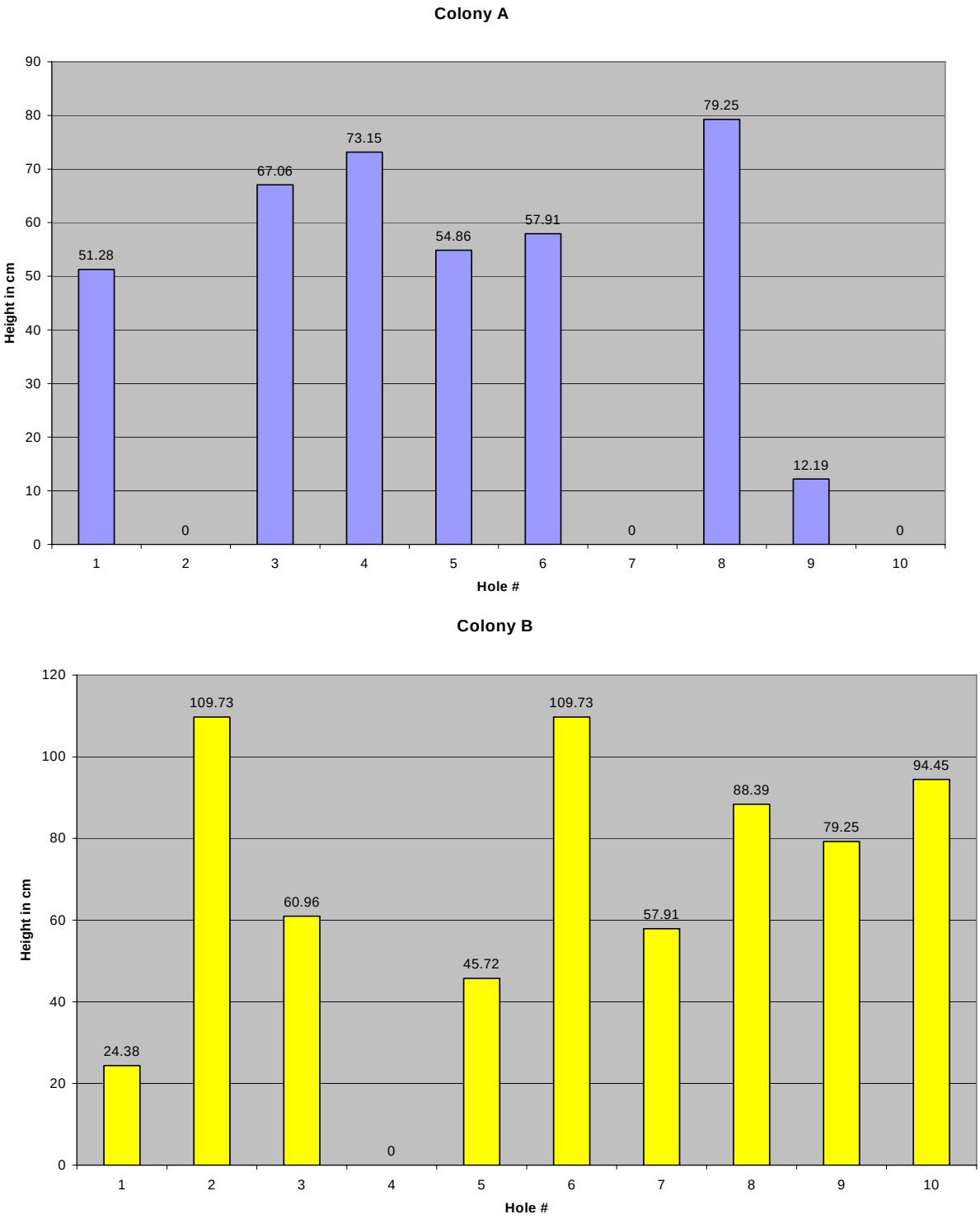

Figure 2: Burrow Height from Base of Hillside – Colony A Mean: 39.57 cm, Median: 53.07 cm, Mode: 0 cm; Colony B Mean: 67.05 cm, Median 70.11 cm, Mode: 109.73 cm