

Guinotia Denetata Attraction to Color Introduced to Mimic Their Burrows and Nocturnal Behaviour

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Abstract

Crustaceans, and in particular crabs have many unknown aspects regarding their behavior and communication methods. This project was designed to try to understand more about one species of crab called the cirque (*Guinotia dentata*) since information about them is scarce. An artificial set up was created that included several colors including one that mimicked their burrow and night time. no distinct patterns of color selection or preference were found.

Introduction

The terrestrial species of crab located on Dominica are not widely known, there is scarce documentation, and not much is known about them. Several different crabs were captured and determined which ones were the best subjects to experiment on in terms of health risks for the conductor and cooperation, and various other reasons. Crab species were eliminated as candidates from the experiment based on habitat (crabs at Batale beach), level of aggression (white crab), and level of competence (hermit crab). the endemic crab called the cyrique was determined to be the best candidate suitable due to its availability and semi-docile nature.

Scientific name	Common name	Location
<i>Coenobita clypeatus</i>	Hermit Crab	Cabrits, Batali beach
<i>Guinotia dentata</i>	Cirque	Springfield Station, Trail to Boeri lake, Freshwater lake, Water Reservoir
<i>Cardisoma guanhumi</i>	White Crab	Cabrits
<i>Geograpsus lividus</i>		Batali Beach
<i>Grapsis grapsis</i>		Shore of Cabrits

Table 1: Crab species collected and collection localities

Phylum Arthropoda
Subphylum Crustacea
Class Malacostraca
Order Decapoda
Suborder Reptantia
Section Brachyura
Family Pseudothelphusidae

Subfamily Pseudothelphusinae
Guinotia dentata. Cirques

Phylum Arthropoda

Organisms are considered arthropods if they have an exoskeleton, a segmented body, and jointed appendages. This phylum consists mainly of crustaceans, insects and arachnids. Another important characteristic is the material that the shell is made up of chitin such as insects or other minerals.

Crustacea

Crustaceans have three distinct body segments which include the head, thorax (head and thorax may be fused), and abdomen. Their shells have to be moulted in order for the organism to grow and expand. Appendages are biramous (can function as gills), they typically have two pairs of antennae, and the body cavity has an open circulatory system.

Malacostaca

The largest of the crustacean classes; they have nineteen pairs of appendages, the first thirteen being part of the cephalothorax, and the rest part of the abdomen. The appendages located on the abdomen are often chelate.

Decapoda

The name refers to how many legs the organism has; the first two, which are chelae, have been modified for defence and feeding, while the rest are modified for locomotion. The head and thorax have been fused to create what is known as the cephalothorax. They also have stalked eyes, one pair of mandibles, and two pairs of maxillae located on the cephalothorax. This order contains shrimp, prawns, lobsters, and crabs.

Reptantia

The order decapoda splits off into two different suborders; the one that was studied was Reptantia which contains crabs.

Brachyura

These crabs are considered true crabs because they either have a reduced tail or their abdomen is completely hidden underneath their cephalothorax.

Pseudothelphusidae

This family of crabs is found only in the tropics where they are considered terrestrial and found near rivers and other water sources.

Cirriqua

Upon observations, this particular crab comes out at dusk which is the best time to catch them. There have been reports of them coming out at night and coming out after

rain, but there have been sightings at all times of the day. The best time to catch them was at dusk. Adults tended to be a bit more defensive compared to the younger ones as they ran away at the sight of danger at all times. The majority of the cirques that were caught were very docile, but caution was used while handling them; to pick them up they were grasped right behind the first pair of legs (claws).

This report is dedicated to understanding a little bit about their behavior and attraction to different colors. The color black was used as a control to mimic their burrow in a sense and see if they are attracted to it, and this color also tested reports of them being nocturnal. After observing them for a while they can only focus on one thing at a time making it ideal for experimentation.

Materials and Methods

The cirques were collected at various locations that were suggested to by Dr. Woolley and Dr. Lacher, and locations found in the report by Kristy Venable. The first crab was found on the station by Houston Miller, the second was captured and returned to Emerald pool, the third was captured by the restrooms on the station, and the final one was captured along the trail to Boeri lake. The crabs that were used as part of the experiment they were kept in plastic containers, fed mangos and bananas daily, and given water for moisture daily.

the six colors that were used were (b)lack, (w)hite, (d)ark (b)lue, (p)ink, (o)range, and (y)ellow); there were ten different color combinations with black being the control for the experiment. four colors lined a holding cell that was 14 x 14, but was shaped to be cylindrical. 15 minutes was given each time to allow the crab to choose a color. The data was then recorded and the area was switched another combination. Each crab went through one trial, with the exception of crab two which went through two trials.

Results

	Crab 1	Crab 2		Crab 3	Crab 4
Color Combo.					
B,W,Y,P	B	B	P	B	P
B,W,Y,DB	DB	DB	DB	Y	B
B,W,Y,O	W	O	O and Y	O	B
B,W,P,DB	O and W	P	B	W	P
B,W,DB,O	O and W	W	O	O and W	O
B,W,P,O	B	O and P	W	W	O
B,Y,P,DB	Y	B	DB	P	DB
B,Y,P,O	Y and O	O	O	B	P
B,Y,DB,O	Y	O	Y	Db	DB
B,P,DB,O	B	O	P	Db	B
Percent Black	3/10	2/10	1/10	2/10	3/10

Table 2: Color chosen by each crab

This table indicates the color that crab chose at the end of each trial. If the response was for example O and P, that means the crab was between pink and orange.

Observations:

Crab 1: This crab was a small female that was very calm. Did not display any odd behaviour, and had her back to the color when she was checked on.

Crab 2: Same description as the previous one, except this female was older and about a quarter larger than the first one.

Crab 3: The crab had color loss on the top of its shell, almost yellowish with very little brown. This crab seemed very attentive, and showed aggression in the form of its pincers being raised as soon as the color was being changed. At times the crab was looking at the color, but turned around whenever I approached.

Crab 4: This crab was another juvenile female that was very calm, and at times was found to be looking at the color when she was checked on.

Discussion

This experiment started out as a study on the reaction of crabs to different colors of poster board as more of a prototype experiment. The only crabs that were used were a very old female which was let go immediately after a trial run and a juvenile as the experiment showed less than impressive results. The crab was held until it calmed down before the experiment was conducted. I would start eight feet away and slowly approach the pen. The only thing that could be salvaged from that experiment was the fact that when the color was placed down next to the pen, the crab would then scuttle away. Upon recommendation of Dr. Fran Gelwick the experiment changed into something almost identical to the one that this paper is based upon, except it was a smaller pen. Upon further recommendation from Dr. Lacher, the pen was increased two fold allowing the crab to further move around and choose a color, which is the final

experiment that this paper is based upon.

The experiment revealed no significant pattern on the selection of colors, even though the crab was given more time and area to select a color. This experiment failed to support any intentions that crabs would be attracted to any specific color. One thing to keep in mind for further experimentation these crabs can be very hard to capture for various reasons, but are very good test subjects once captured due to their docility, the majority of the time.

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