

Caribbean Reef Squid, *Sepioteuthis sepioidea*, Coloration and Behavior

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Introduction:

The Caribbean Reef Squid, *Sepioteuthis sepioidea*, is in the Class Cephalopoda in the Order Mollusca. They are characterized by having two longer tentacles used to capture prey and eight smaller arms all located near the mouth. The head is also comprised of the mantle which houses all of the stomach, reproductive and digestive organs. The Caribbean Reef Squid have fins that span the entire length of the body (MarineBio, 2008). All squid can control the color of their body and by doing so they can communicate with other squid in the shoal (group). The color changes are managed by chromatophores which show reds, yellows, browns and blacks; iridiphores display blues and greens. By the retraction and expansion of the individual pigment cells, the color of the squid changes allowing different colors to be more or less prevalent. These cells are manipulated by the brain directly which are connected to nerves which send impulses through a series of muscles (Marine Biological Laboratory, 2008). I hypothesize that *S. sepioidea* at the Champagne Reef have specific color patterns that correlate to certain external stimuli. I tested this hypothesis by snorkeling out to the large shoal of squid at Champagne Reef consisting of approximately 150 members, and monitoring them. I recorded any color changes of a certain squid and the changes occurring in the immediate vicinity of that particular squid.

Materials and Methods:

I prepared to do research in Champagne Reef by trying wetsuits and found one that fit comfortably. I then found a pair of fins that were my size and a mask that made a correct seal on my face. I first sighted *S. sepioidea* when I went down to Champagne Reef for my group research on coral richness. They interested me by all of the amazing color

variations that they could change instantaneously. I looked up the species name in the Reef Fish Identification book (Humann, 1994). I then went down to Champagne Reef on three separate occasions for observation. On each trip I brought the wetsuit, fins, mask and a snorkel. To prevent fogging in the mask I washed it out with baby shampoo before putting it on. I then went out to find the squid and I floated above them. I watched three squid at a time for two minutes each. I made note of the color of the squid when I first saw them and recorded any color changes on an underwater tablet. Any more than three squid at a time was too difficult to observe because they were constantly swimming in different directions.

Results:

Initial Color and Changes according to Time each Day

Day 1 (May 30)

Time:	Observation:	Initial Color:	Color Change:
3:20-3:22	A	B/Gr	G with ES- Color of closest members in the shoal
	B	B/Gr	
	C	B/Gr	
3:25- 3:27	D	B/Gr	
	E	B/Gr with G spine	
	F	B/Gr with W spine	
3:29- 3:31	G	B/Gr	
	H	B/Gr	
	I	B/Gr	
3:32-3:34	J	B/Gr	
	K	B/Gr	
	L	B/Gr	
3:37-3:39	M	W- Swimming back and forth next to squid N	
	N	P with W spine- Swimming back and forth with squid M	
	O	B/Gr	
3:42-3:44	P	G with W spine	
	Q	B/Gr	
	R	B/ Gr	

Day 2 (June 1)

10:10-10:12	A	W arms and end- Shoal split up and was left in the middle of the two groups	
	B	W	
	C	B/Gr	G- Fish
10:15-10:17	D	B/Gr	
	E	B/Gr	G- Fish swam under
	F	B/Gr	
10:17- 10:19	G	B/Gr	P and W- Swam to another squid and fought
	H	B/Gr	
	I	B/Gr	W- Attacked another B/Gr squid that was next to another squid (female?)
10:23-10:25	J	B/Gr	
	K	B/Gr	G with ES- Fish
	L	B/Gr	

Day 3 (June 4)

2:15-2:17	A	P with W spine- Under squid C and made squid B swim away	
	B	B/Gr	
	C	W- Above squid A	
2:18-2:20	D	B/Gr	
	E	W	
	F	B with W arms- Needlefish swam by	
2:21-2:23	G	B/Gr	
	H	B/Gr	
	I	B/Gr	G- Fish swam by
2:24-2:26	J	B/Gr	
	K	B/Gr	
	L	B/Gr	
2:26-2:28	M	B/Gr	
	N	B/Gr	G- Fish swam by
	O	B/Gr	
2:29-2:31	P	P and W- <i>Doryteuthis plei</i> squid above	
	Q	P and W- <i>Doryteuthis plei</i> squid above	
	R	B/Gr	
2:32-2:34	S	Light B almost W- Swimming over light sand	
	T	Light B almost W- Swimming over light sand	
	U	Light B almost W- Swimming over light sand	

Key:

B= Brown
G= Gold
ES= Black eye spots
W= White
P= Purple
Gr= Green

Discussion:

The data collected during my observations supports my hypothesis-that there is a correlation between the color of the squid and the stimuli around it. The squid color pattern shown can be considered a visual interpretation of the surrounding environment. The gold color expressed by the *S. sepioidea* can be hypothesized to be a sign of slight uneasiness or frightfulness. Every time a fish swam by the squid it turned a golden color. Also one squid turned gold when a larger squid swam which also supports this hypothesis. If the squid was scared enough it just swam away, sometimes fading into a lighter color to blend in with the open water (MarineBio, 2008). On day 3 the squid over the lighter sand seemed to display a form of crypsis. The squid tried to blend in more with their surroundings by changing to a faint brown or tan color instead of their usual brownish green. The color change could have also been due to fright but the squid were not jetting away so this makes me believe that they were solely trying to blend in with their surroundings. Besides, *S. sepioidea* did not merely flash the lighter color; it was continuous for the entire two minutes. The white color seems to be some sort of display for the opposite sex. It could be a characteristic for sexual selection since the white one swam parallel the other back and forth which is a show of courtship (Anderson, 2008). The whitish purple color of the Caribbean Reef squid could be a sign of aggression since on two separate occasions the squid changed this color and attacked other members of the

shoal. This color pattern could also be a display for the opposite sex because in both cases there was a white squid near it. As well, squid are more aggressive during times of mating when usually they are docile creatures (McKay, 2008). The other two times the color was seen were when another species of squid (*Doryteuthis plei*) was above the *S. sepioidea*. There are about forty different patterns in total expressed by *Sepioteuthis sepioidea*, however there were only three that I witnessed amongst the squid at Champagne Reef (Byrne et al., 2003). The white color indicates courting while purple denotes aggression. When the squid are afraid they change to golden hue. This holds true to my hypothesis.

In order for these hypotheses to be well supported significantly, more observations should be done. These could be conducted in the open ocean or in a controlled setting with reared squid but it is hard to maintain their health in an artificial setting (Boal and Gonzalez, 1998). The problem with doing research in the open water with out tagging the squid is that there is no way of identifying individual squid. Also the shoal of squid might not come back to the same place during the day everyday, or it could be a different shoal.

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