Size in comparison to reemergence time in the feather duster worms, *Sabellastarte magnifica* and *Anamobaea orstedii in Boca del Drago, Ísla Cólon, Bocas del Toro, Panama*

Abstract

This study was conducted on the feather dusters in Pete's Reef off the coast of Bocas del Toro, Panama. Feather dusters are worm like marine creatures that feed through their tentacles and can retract into their tubes as a self-defense mechanism when disturbed. Fifty individual subjects were tested in order to compare two species and their difference in size in relation to the difference in reemergence time. It was found that the *Sabellastarte magnifica* feather dusters, the larger species, has a much slower average reemergence time then the smaller species, the Anamobaea orstedii feather dusters. Within each species, the same concept holds true as the smaller animals reemerge faster than the larger ones. This study can help us further understand some potential risks of tourism on the different species of feather dusters.

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Introduction

Feather dusters are wormlike marine animals. They live inside chitinous tubes that can be found buried in sand or attached to rocks, shells, and coral. The average size of the Anamobaea orstedii feather duster's crown is 5 cm which is smaller than that of the *Sabellastarte magnifica,* with an average size of 15 cm (Humann & Deloach 2002). They are filter feeders who consume plankton and other nutrients by curling their tentacles, thereby creating a downward current towards their mouths. When there is a disturbance in the water, or any other indication of danger, they suck their tentacles into the tubes to remain safe. (Barnes 1980)

We noticed that the feather dusters were reemerging at different times, some almost immediately after retraction and some staying under much longer. We were curious as to what factors were influencing this reemergence time. This sparked interest to look into the trade-offs, adaptions and differences in the feather dusters. Our hypothesis was that the larger the feather duster, the longer the time spent inside the chitinous tube after initial submergence would be. Our hypothesis was based off the idea of an evolutionary trade off. It was speculated that because *S. magnifica* feather dusters are larger, they will be able to absorb food more easily due to a larger surface area. It could be assumed that as a trade off for this increased access to food, their large size makes them the more attractive species for predators which is why they stay in their tubes longer then the A. orstediis.

Materials

The materials used in this study were two digital waterproof stop watches that recorded in minutes, seconds and milliseconds, an underwater slate and pencil, and snorkel gear, including fins, mask and snorkel.

Methods

The study was conducted on the outskirts of Pete's Reef in Bocas del Toro, Panama. Participants began by searching for individuals of the feather duster worms. *A.orstedii* and *S. magnifica*. Samples were taken along a transect at the edge of the reef so as not to test the same feather duster twice. The focus was on getting a sample of feather dusters that represented the different varieties, sizes, and environments evenly. Once a feather duster was chosen, one participant would move their hand towards it until it withdrew, at which instant another participant began timing. In an effort to not cause disturbances in the water while the feather duster was retracted, only the person timing the Feather Duster stayed behind waiting for it to reemerge. This was done in an effort to not affect its reemergence time. The instant that the feather duster returned to its fully emerged size, timing was ceased and the time was recorded. Along with the time, notes were taken of size (classified as small, medium, or large), variety (A. orstediied or *S. magnifica*), and surroundings (whether or not it was on coral, and the amount of fish surrounding it).

Results

Figure 1 shows that the reemergence times of the A.orstedii feather dusters are overall faster then those of the *S. magnifica's*. The results of our T tests, table1, show that there is no significant difference between the average reemergence time of the small magnificent feather dusters when compared with the small split crown feather dusters. Within the medium and large categories, however, the difference in

reemergence time between the two species is significant, as confirmed by our T tests, table 1. Within each species, reemergence time increases very gradually as the size increases. Because of this gradient, the reemergence time from small to medium is not statistically significant as shown by table 1. However, the times of the small feather dusters when compared to the times of the large yield results that point to a significant difference of reemergence time linked to the size of the feather dusters.

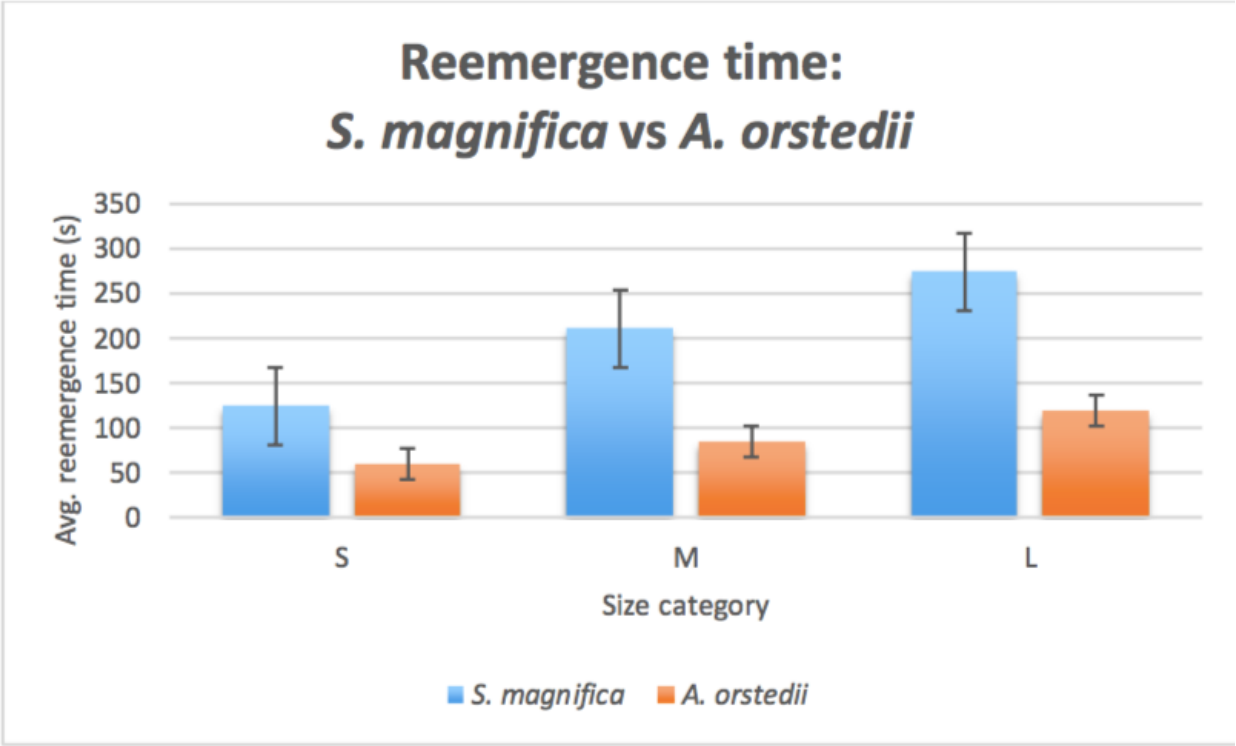

Figure 1 Mean reemergence time in two species of feather dusters, *S. magnifica and A. orstedii* in three size classes.

	P value	N
S v M *A. orstedii*	0.10	22
M v L *A. orstedii*	0.21	16
S v L *A. orstedii*	*0.0093	13
S v M *S. magnifica*	0.16	15
M v L *S. magnifica*	0.40	13
S v L *S. magnifica*	*0.023	11
S. magnifica v A. orstedii	*3.49E-05	47

Table 1. P value chart of all the relations within species for each species as well as a value for between the species. T-tests for independent samples were used in all cases

Discussion

Our hypothesis is supported by the data collected that the larger species have longer reemergence time in comparison to the smaller species. When the reemergence times are compared within the species, there does not appear to be significant change between small and medium and medium and large. However, when the small and large categories of each species is compared alone, there are significant differences between them showing significant differences.

With more literature research into each species, it was found that *S. magnifica* feather dusters are slightly toxic (Barnes, 1980). This ties into our results and offers another possibility of why the *S. magnificas* are significantly slower to reemerge. They are far less sensitive than the A.orstedii and only react when touched or there is a great disturbance at close quarters. The possible circumstances that cause the A.orstedii to go under are far less drastic, as they could be triggered by something as unthreatening as

a current underwater. Because the *S. magnifica* only goes under when there is a high possibility of a threat, it likely stays in its tube for longer. Waiting longer will increase the chance that the threat will pass by. Since the *A. orstediis* retract more often, they are forced to spend less time in the tube in order to insure maximum time outside of the tube feeding. This is shown by their sensitive reaction as well as their fast reemergence time. The larger *S. magnifica's* however, go under far less frequently which gives them the ability to spend more time in the safety of their tube.

We speculate that there is could be an observable evolutionary trade off with the *S. magnifica* feather dusters. Being one of the largest species gives the feather duster more surface area to absorb more nutrients and food. In doing so, they are more appealing and obvious to predators. Returning to our original hypothesis and joining it with our new findings. We can now speculate that because of their size and attractiveness to predators, there was selective pressure for *S. magnifica* to develop a new defensive technique (toxicity).

Conclusion

In doing this study it became apparent that the larger the feather duster, the longer the reemergence time. The observance of the reemergence time gave insight into the evolutionary trade offs and adaptions of the feather dusters. The longer reemergence times of the *S. magnifica* feather dusters were shown to correlate with their large size because of their poisons and therefore lack of extra caution. The smaller *A. orstediis* have a shorter reemergence time because they are more prone to retraction, and therefore need to come out again as soon as possible to maximize time spent feeding.

One possible important outcome of this is experiment is the information it lends to the affect of humans on these animals. The study shows how different species react differently to disturbances in their environment, which could be used to understand how tourism is affecting the feather dusters differently. In tourist heavy areas where snorkelers are in abundance, this study could shed light onto the impact of

tourism on feather dusters. If people are constantly in the reef, the feather dusters might be inside the tubes for longer periods of time than normal, therefore hindering their feeding time and their over all health. This could affect the species in general.

References

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Humann P./DeLoach N., 2002: Reef Creatures Identification, New World publications