MELANELLA ACICULATA DENSITIES ASSOCIATED
WITH HOLOTHURIA ATRA

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ABSTRACT:

This study investigates the relationship between the parasitic snail *Melanella aciculata* and the sea cucumber *Holothuria atra*. *Melanella aciculata* were collected from *H. atra* obtained at two sites on the north eastern end of Oahu, Hawaii. More cucumbers were found at the Kahuku site than at the Clissold's site. Regression analysis indicated that there was a significantly positive relationship between the number of snails collected and the number of cucumbers collected. Snail infestation also varied (p<0.05) by month. Infestation rates were highest in February and lowest in September. This study showed that the *M. aciculata* populations correlated to *H. atra* populations and was an observation of parasite to host population densities.

INTRODUCTION:

Parasites are ecologically significant organisms and that must be understood in order to properly understand a community (Deng 2001). In the Mediterranean region *Melanella alba* is found as a parasite on sea stars (Diakin 2004). These Gastropods range from two mm to seven mm in length (Daikin 2004). *Melanella aciculata*, a small snail parasite of sea cucumbers, lives in the Hawaiian Islands (Gato 2010). Four species of *Melanella* have been documented in Hawaii (Lyskin and Britaev 2005). *Melanella aciculata* have a straight, solid, slender and suture flush shell (Enzo & Jakov 2009). They are a white needle-like Eulimid (Hirofumi 2006) and are usually found on the ventral side of the *Holothuria atra* (Garvie 1996, Campbell 2009). Campbell (2009) demonstrated that water conditions and pollution greatly influenced this gastropod’s life cycle. This research compares the population densities of *M. aciculata* and its
host *H. atra* from two separate sites with differing wave action; one being more protected and the other is more exposed to waves.

**METHODS and MATERIALS:**

Site one was an unprotected site as the ocean waves swept the reef off the edge of the Kahuku Golf Course, Kahuku, Hawaii (21° 20' 32" N, 157° 49' 34" W). The second site was Clissold’s Beach, Laie, Hawaii (site two-21° 19' 32" N, 157° 50' 34" W). All available sea cucumbers were hand collected from the reef. Each collection was approximately one and one half hours long. They were isolated individually in labeled zip lock bags. Their length was measured immediately upon collection. In the laboratory, the exterior of each sea cucumber was searched for the presence of *Melanella*. The number of *M. aciculata* on each sea cucumber was recorded and their location on the host was noted. The parasites were removed from the cucumber by gently plucking them. They were measured from the posterior apex to the anterior bulge in millimeters using a straight edge. The results were then compared using two way ANOVA. Of the two analyses done the first was on the relationship between finding the cucumbers at each site and the second was comparing the number of snails to the number of cucumbers captured. These points were plotted in a regression line.

**RESULTS:**

Thirty-one percent of the 97 *H. atra* collected housed *M. aciculata*. Single parasites were found on 16 percent of the cucumbers. Fifteen percent had two or more parasites. Eighty-six
percent of the parasites were located on the ventral side of the host (Figure 1). Thirteen *M. aciculata* were found on the dorsal side of the *H. atra*. The length of *M. aciculata* ranged from 1 mm to 9 mm with an average of 3.5 mm (Figure 2). A significant (*p*=0.004) relationship between the abundance of *H. atra* and the number of *M. aciculata* was found (Figure 3). The regression showed a positive correlation in *M. aciculata* to *H. atra* populations (Figure 3). There was also a significant difference (*p*=0.048) in the number of *H. atra* collected between months of the year and location (Figure 3). *Melanella aciculata* numbers were higher February, March and October (Figure 4). *Melanella aciculata* were significantly more abundant at the Kahuku site than the Clissold’s one in five out of six months (Figure 4).
Figure 3: *Melanella aciculata* increased with the number of *Holothuria atra* that were captured. The regression used data from both locations.

Figure 4: The comparison of the *Melanella aciculata* populations in the Kahuku Reef versus the population in the Clissold's area during different months of the year.
DISCUSSION & CONCLUSIONS:

*Melanella aciculata* are commonly found on the ventral surface of cucumbers at any depth in the intertidal zone of the Hawaiian Islands (Gato 2010). These *M. aciculata* can attain a length of up to 12 mm in Hawaii and the Indo-west Pacific (Lyskin & Britaev 2005). The longest *M. aciculata* found in this study was 9 mm in length. The number of *H. atra* collected and the site at which they were taken from influenced the number of *M. aciculata* found. *Melanella aciculata* populations were correlated to *H. atra* populations. Also, cucumbers were found in higher numbers at site one rather than site two. This also resulted in the number of snails that were collected from each site. The method for collection of cucumbers was not always consistent. In some months collections were conducted at low tide making it more difficult to collect samples because they were hiding due to tide fluctuations. In the months where collections were taken at higher tides more samples were captured. The monthly variation of the cucumbers found was related to the conditions of the intertidal zone during the collection. This research demonstrated the occurrence of *Melanella aciculata* and its location on the host *Holothuria atra* from two different sites studied.
WORKS CITED:


