Host Preference of *Arctonoe Vittata* found in *Cryptochiton stelleri, Diodora aspera and Dermasterias imbricata*

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Introduction:

The red-banded commensal scale worm *Arctonoe vittata* inhabits a range of hosts on the Pacific northwest coast, including *Dermasterias imbricata* (leather star), *Diodora aspera* (rough keyhole limpet) and *Cryptochiton stelleri* (gumboot chiton). Previous studies have shown that *A. vittata* is chemically attracted to *C. stelleri* and *D. aspera* (Wagner *et al.*, 1979). An additional study in 1979 showed that the host *D. imbricata* was also attracted to *A. vittata*, consistently choosing *A. vittata* over food, other *D. imbricata* and similar polychaete commensals (Wagner *et al.*, 1979).

While evidence for a chemical attraction between *A. vittata* and these hosts is well established, there has been little research on whether or not *A. vittata* prefers one host over another. Each host provides differing levels of protection, along with different sizes in area for the scaleworm to occupy. *D. imbricata* has narrow ambulacral grooves, whereas *C. stelleri* and *D. aspera* provide shelter in their relatively large mantle cavities. *D. aspera* also provides protection underneath its shell. In this exploratory, it is hypothesized that *A. vittata* will show a preference for one of these hosts based on the advantages and disadvantages conferred by each.

Methods;

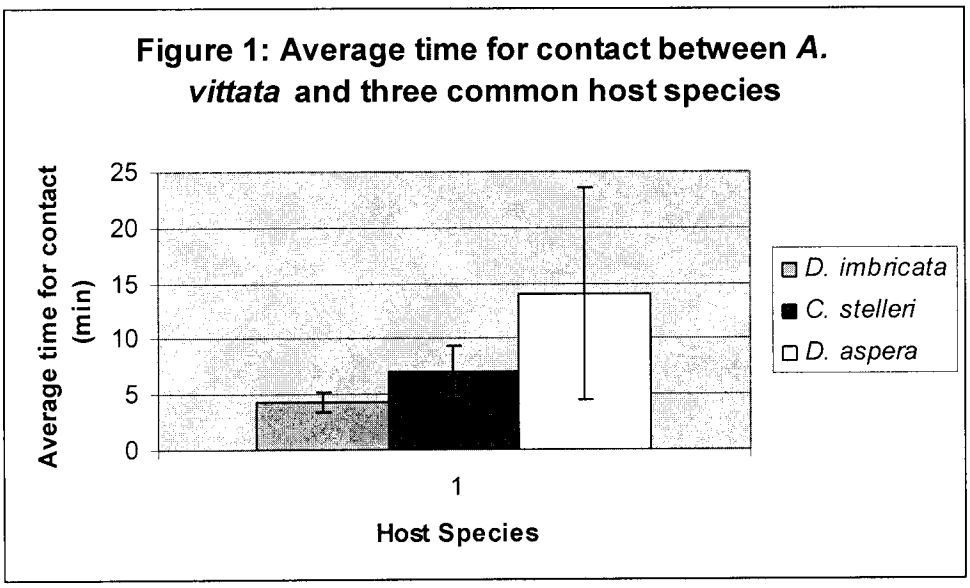
A vittata were collected from *D. imbricata, C. stelleri* and *D. aspera* from Cape Blanco, Charleston Boat basin, and the South and Middle Coves of Cape Arago, all on the southern Oregon coast in July, 2005. The three host species were also collected from these locations. The rate of incidence of A. *vittata* was also noted collectively in the field and in the lab. Originally trials were to be run with scaleworms collected from each of

the species; however the majority of the worms collected from *C. stelleri* and *D. aspera* deceased before the experiment began. Thus only worms from *D. imbricata* were used for data collection.

In order to determine host preference, I recorded the amount of time it took for *A. vittata* to recognize and come into contact with each host species. A large, flat tray measuring was set up with water and airflow for the trials. In each trial, two hosts of the same species were placed approximately 15cm apart. Three worms, selected at random, were then placed directly between the 2 potential hosts. The time on the stopwatch began when the worms were placed in the tray. The first two scaleworms to come into contact with either host provided the two data points for that trial. The trial was repeated three times for each host species, providing six data points total for each host species. The average time for *A. vittata* to recognize and reach the host represents its attraction to that host, and these values were used to asses its host preference. If a host moved a significant amount during the trial, it was returned to its original location in the tray.

Results:

Figure 1 below shows the average amount of time it took for *A. vittata* to recognize and contact each of the three species.



In each of the trials the scaleworms remained relatively stationary for a period of time, and then appeared to pick up the scent of the host and travel directly toward the host at a much quicker pace. In some cases (mainly the trials with *D. aspera*) the scaleworms moved to the edge of the tray and stayed there for the rest of the trial.

The trials with *D. aspera* provided only three data points because they were stopped after twenty minutes, and in only three cases did the scaleworm contact the host in under this time limit.

Ideally each trial would have been repeated with *A. vittata* collected from each species to provide a control for the experiment. However since the majority of the worms from *C. stelleri* and *D. aspera* died early, only one control trial was performed. A scaleworm collected from *D. aspera* was placed in the tray with two *D. aspera* individuals, and it took twenty minutes for the scaleworm to reach the host.

It was found that the rate of incidence in the field of *A. vittata* was approximately 30% (7/23) in *C. stelleri*, 90% (9/10) in *D. aspera* and 71%(5/7) in *D. imbricata*.

Discussion:

The data collected in this experiment suggests that *A. vittata* shows a slight preference for *D. imbricata* in comparison to *C. stelleri* and *D. aspera.* However due to the data overlap shown in Figure 1, the data collected in this experiment proves to be somewhat inconclusive. *A. vittata* has also been found living commensally in pagurids off the coast of Alaska and *A. amurensis* in Japan (Hoberg *et al.,* 1982; Goggin *et al.,* 1997), suggesting that *A. vittata* may be a generalist in terms host preference. In order to make any suitable conclusions about host preference on the Pacific Northwest coast, more data would have to be collected in a similar manner. It would be interesting to compare the rate of incidence in the field of *A. vittata* in each host with its host preference analyzed in the lab, since the results of this exploratory show no correlation. In future studies, it would be critical to collect more data points for statistical analysis in order to make valid conclusions.

The observation that the scaleworms appeared to recognize the scent of the hosts and head straight for them suggests that chemoreception plays a role in recognition. This is further backed up by a 1978 study that showed that the basis of host recognition in *A. vittata* is the reception of unidentified metabolites of its hosts (Britaev *et al.,* 1978). While observations strongly suggest that *A. vittata* is able to recognize different hosts, it remains unclear whether or not the scaleworm exhibits a preference between *Dermasterias imbricata*, *Diodora aspera* and *Cryptochiton stelleri*

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