

**Influence of Covering Through Use of Verrucae, Individual Size, and
Solitary vs. Colonial Lifestyles on the Amount of Water Loss Through
Desiccation**
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Introduction

Anthopleura elegantissima, commonly known as the aggregating anemone, is a common intertidal animal along the Pacific coast. *A. elegantissima* is most often found attached to rocks in the mid to low zones of the rocky intertidal and in tide pools as well (Kozloff). *A. elegantissima* is almost always found in large clumps of clones and only very rarely solitary, and when solitary the anemone is almost always in tide pools. One distinctive characteristic of the genus *Anthopleura* is the presence of verrucae. Verrucae are adhesive, hollow evaginations on the column of the anemone (Daly). On sunny days *A. elegantissima* is often found covered in sand and shell bits which are attached to the verrucae. Yet on overcast days this is not generally seen. This gives credence to the fact that *A. elegantissima* can selectively pick up or drop their coverings depending on the environmental conditions it is in. Indeed often animals that were covered in sand and shell fragments in the field drop all their coverings when in the lab and not exposed to sunlight. This leads one to believe that *A. elegantissima* can not only control the adhesiveness of the verrucae but also detect environmental conditions such as sunlight and UV rays. This is a rather important behavior as well as adaptation for *A. elegantissima* as one of its largest threats is desiccation. In fact depending on its exact location some *A. elegantissima* anemones can be exposed to air approximately 90% of the time (Shick and Dykens). Clearly not only is the size of the group but also the use of verrucae important in helping to prevent desiccation. The question remains however how much of an impact does the use of verrucae and group size have on desiccation in these animals? The hypothesis is that the larger the anemone, the more cover it has, and the larger the grouping of anemones the less amount of water it will lose through desiccation.

Methods/Materials

Anthopleura elegantissima was collected from Sunset Bay, Coos County, Oregon, and North Cove, Cape Arago, Oregon. *A. elegantissima* was then sorted out at the lab according to the amount of coverage on the anemone and the size of the anemone. One small anemone, one large anemone, and a clump of anemones had all of their coverage removed from their verrucae and placed each in their own container. A small anemone and a large anemone both with moderate coverage of sand or shells were each placed in their own container. A small anemone, a large anemone, and a clump of anemones all with extensive coverage of sand and shells were placed in separate containers. The anemones were allowed to settle and attach to the bottom of the containers for a minimum of one and a half hours. The water was then suctioned out of the container so as not to disturb the anemones. The anemones were then weighed and placed outside in the sun. After a half hour, the anemones were brought back inside and any water in the bottom of the container was suctioned out. The anemones were then weighed for water loss and placed outside in the sun again. This was repeated for two and a half hours.

Results

Over all water loss was greatest during the first half hour that *Anthopleura elegantissima* was out of water and exposed to sun light (Figure 1). The longer *A. elegantissima* was out of water and exposed to sun light the less water it lost (Figure 1). The amount of cover in the form of sand and shells that *A. elegantissima* had also had an effect on the rates of desiccation. Those with no cover suffered the greatest amount of water lost, where as those with the most cover and those in clumps had considerably

lower water loss (Figure 2). All of the anemones were able to recover from the desiccation within three hours of being re-submerged in sea water.

Conclusion/Discussion

Anthopleura elegantissima is faced with the problem of desiccation everyday. In order to reduce the effect of desiccation *A. elegantissima* employs the use of its verrucae. By using the verrucae to pick up sand, bits of shell, and other small objects, *A. elegantissima* can successfully block some of the sun's light from reaching the vulnerable skin of the anemone. Thus the sand and bits of shell seem to act as a sun screen or an "umbrella". By using the verrucae to utilize this cover *A. elegantissima* drastically reduced the amount of water loss. *A. elegantissima* also reduce water loss by clumping together. When the anemone was clumped together even the uncovered clumps had less water loss than the solitary anemones with extensive cover. This is understandable because when in a clump the anemone reduces the surface area that is exposed to the sun and to the air, thus reducing the surface area that the anemone can lose water from. The clumps of *A. elegantissima* that had extensive cover had even reduced surface area exposed to the sun and thus exposed to water loss which explains why they had the least amount of water loss. These results support the hypothesis that the larger the anemone, the more cover it has, and the large the grouping of anemones the less amount of water it will lose through desiccation. The fact that all the anemones could recover from the desiccation, including those that had lost up to 85% of their body weight in water is reasonable, especially considering its environment. How much desiccation *A. elegantissima* can withstand however is not clear. This would be something that could be

looked at in further studies as well as if there is an optimum grouping size that would reduce desiccation.

Water loss (g) over half hour periods of time

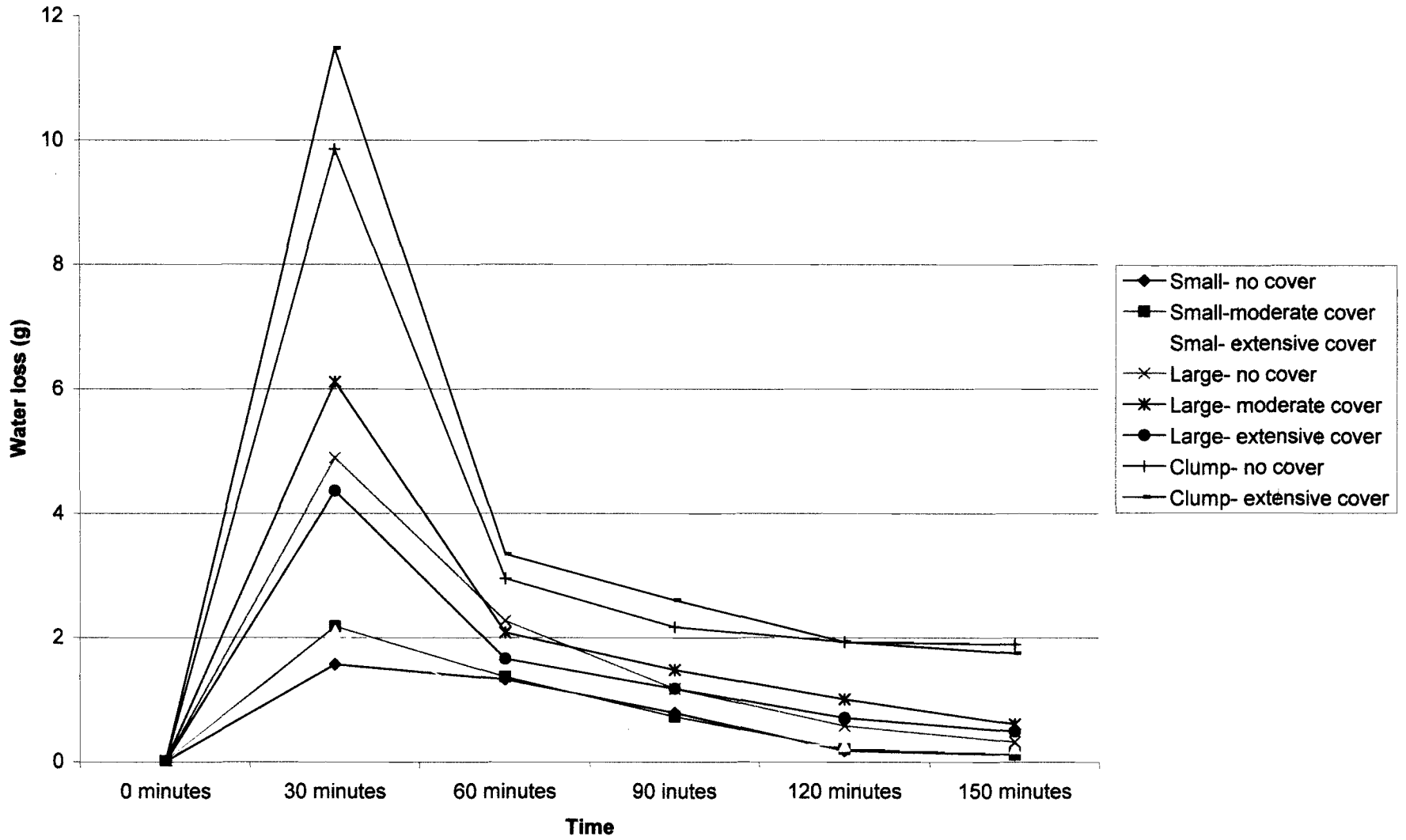


Figure 1

Percent of total body weight lost in 2.5 hours as attributed to water loss

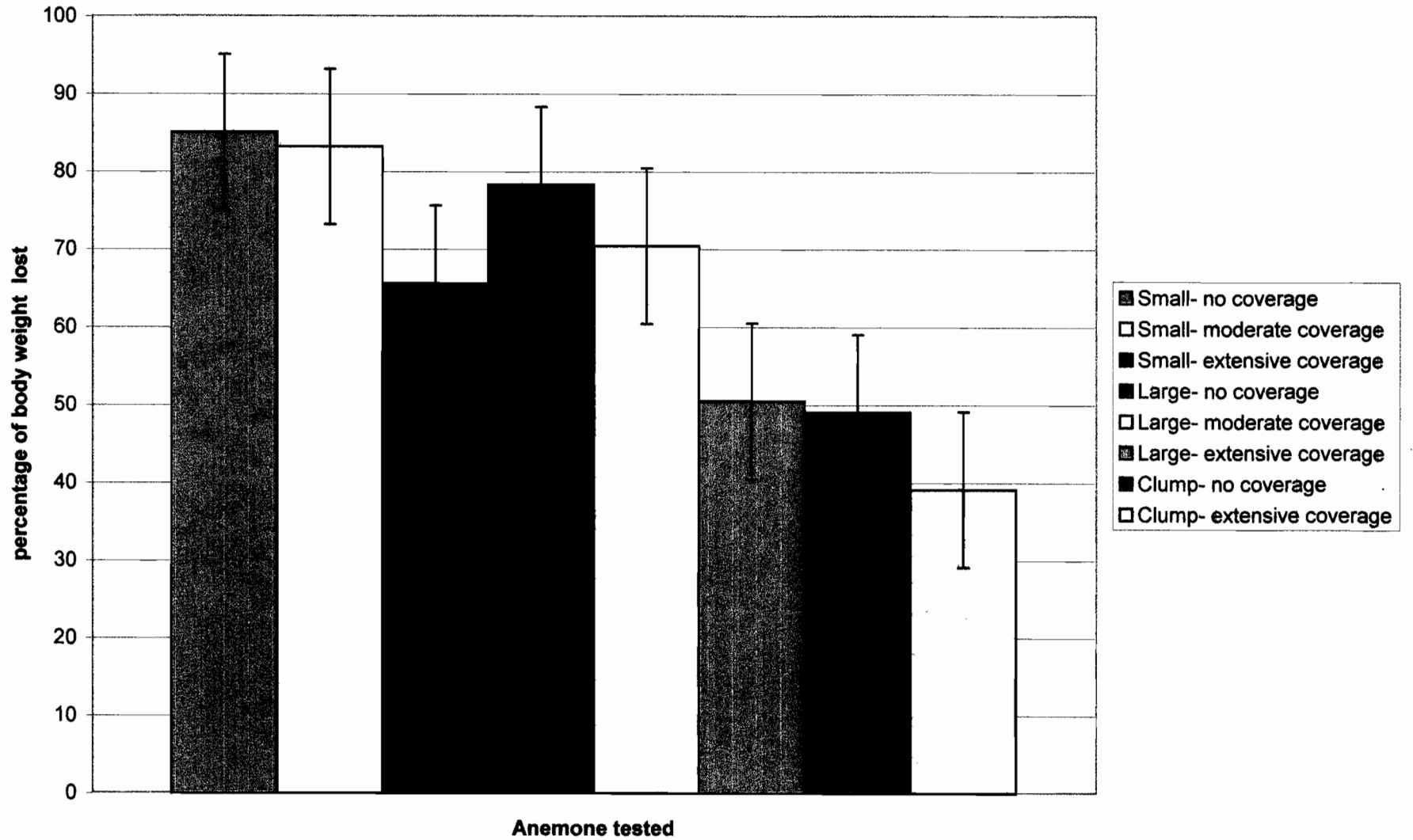


Figure 2

Works Cited

- Daly, Marymegan. "Anatomy and Taxonomy of Three Species of Sea Anemones (Cnidaria: Anthozoa: Actiniidae) from the Gulf of California, Including *Isoaulactinia bespervolita* Daly, n. sp.." Pacific science 58.3 (2004): 377-390.
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- Shick, J. Malcolm , and James A. Dykens. "Photobiology of the Symbiotic Sea Anemone *Anthopleura elegantissima*: Photosynthesis, Respiration, and Behavior Under Intertidal Conditions." Bio Bull 166 (1984): 608-619.