Chthamalus anisopoma

*Chthamalus anisopoma* is the most common species of barnacle in the Gulf of California. This small (<7 mm basal diameter) virtually defines one of the key intertidal zones of this region.

In the northern Gulf of California, there are two morphs of the barnacle. One morph is the typical volcano-shaped form (shown here) that is characteristic of acorn barnacles. The other morph appears bent over, with the rim of its aperture oriented in a plane that is perpendicular to the base. This bent form is induced by and more resistant to attack by the predatory snail, *Acanthina angelica*, which is restricted in its distribution to the northern Gulf of California.

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Fig. 1. Line drawings of the bent (top) and conic morphs of *C. anisopoma*. The rostro-carinal axis of the bent morph is drawn as perpendicular to both the plane of the page and that shown for the conic morph. The apertures of both morphs are closed by the opercular valves (scutum and tergum) of one side only. The right and left valves are generally asymmetric with respect to size (Pilsbry, 1916)
Fig. 2. A bivariate plot of the lengths of the shortest against the lengths of the longest lateral plates for 50 C. anisopoma.

1. IS THERE AN ADVANTAGE TO HAVING THE BENT FORM?

2. IS THERE A COST?

3. IS THE BENT FORM GENETICALLY DETERMINED OR ENVIRONMENTALLY INDUCED?
Desiccation resistance?
Acanthina angelica

Acanthina angelica is a common predatory snail in the northern Gulf of California.

The spine on the lip of the shell is used to push through the opercular plates of barnacles. The spine is then removed, and the snail uses its radula to eat the barnacle. The induced "bent" morph of the barnacle Chthamalus anisopoma is more resistant to attack of this kind.

A. angelica attacking barnacles (Chthamalus anisopoma) at low tide at Puerto Penasco, Sonora, Mexico. Note the bent morphs of the barnacle in the foreground.

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FIG. 3. Survivorship by bent and conic morphs of C. anisopoma in the A. angelica predation experiment. Percentages were back-transformed from arcsine $\sqrt{p}$. Vertical bars are one standard error of the mean.
Fig. 2. Survivorships over time for the conic (●) and bent (○) morphs of *Chthamalus anisopoma* under crowded and uncrowded conditions in the competition experiment. Vertical bars are ±1 standard error about the mean.
Fig. 3. Shell (rostro-carinal) diameter (A) and percent of individuals with eggs (B) as a function of age for the conic (•) and bent (○) morphs of *Chthamalus anisopoma*. Vertical bars are 95% confidence intervals of the means. Percentages were back-transformed from arcsine $\sqrt{P}$. 
Fig. 4. Regressions of shell mass (A) and egg number (B) against body length for the conic (●) and bent (○) morphs of Chthamalus anisopoma. The vertical axes were back-transformed from log(x).
Fig. 1

Probability Cue is Present in Harsh Patch (G)

Frequency of Benign Patch (p)