Effects of CO_2 Induced Sea-water Acidification on the Intertidal Barnacle *Balanus Amphitrite*

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Larval stages of marine benthic invertebrates are highly vulnerable to environmental stressors, however their performance defines adult populations and of can influence post-metamorphic fitness [1,2]. One stressor is expected to affect larvae, is ocean acidification. As carbon emissions continue unabated, pCO_2 levels rise forcing the oceanic pH down (ocean acidification, aka OA). Predictions for pCO_2 levels in the next century will coincide with seawater pH's of anywhere from 7.9 to 7.6, continuing further in the centuries to follow [3,4]. Changes of this magnitude may affect marine larvae by reducing larval heath and performance, altering recruitment patterns and decreasing survival. To analyze just how significant an effect acidified sea-water will have on larvae, we simultaneously measured larval performance (metamorphic success), physiological health (energy reserves), analyzed the larval proteome and examined the shell composition of the barnacle, *Balanus amphitrite* Darwin (Cirripedia; Thoracica) larvae by exposing them to various levels of pCO_2. There was a strong and significant decrease/inhibition in larval metamorphosis at elevated pCO_2, as well as a significant trend in decreasing energy reserves. The larval proteome showed up and down regulation of genes putatively associated to acidification. Our results clearly support the hypothesis that OA will adversely affect metamorphosis in barnacle larvae, possibly by reducing energy reserves, potentially affecting recruitment and subsequent adult populations.

Keywords: Larvae, barnacle, pCO_2, ocean acidification, energy reserves, metamorphosis.

References

[1] J.A. Pechenik, D. Rittschof and A.R. Schmidt, *Mar. Bio.* **115,** 287-294 (1993).
[2] R. Tremblay, F. Olivier, E. Bourget and D. Rittschof, *Mar. Ecol. Prog. Ser.* **340:** 1-8 (2007).
[3] K. Caldiera and M. E. Wicket, *Nature.* **425,** 365 (2003).
[4] IPCC (2007).