Dear Editors,

We are pleased to submit our manuscript, “Short-term mechanisms, long-term consequences: molecular effects of ocean acidification on juvenile snow crab,” for consideration in the Journal of Experimental Biology.

In this study, we use transcriptomics to examine how juvenile snow crab (*Chionoecetes opilio*) respond to ocean acidification across short (8 h) and long (88 d) exposure durations. This work complements a recent experiment showing that juvenile snow crab maintain growth and molting under acidified conditions for many months, with mortality emerging only after prolonged exposure to the most severe acidification treatment. Understanding these mechanisms is particularly relevant given recent declines and environmental stressors affecting snow crab populations in the eastern Bering Sea, where warming and ocean acidification are occurring simultaneously.

Our results show that short-term tolerance is associated with elevated expression of genes involved in energy production in the mitochondria regardless of OA severity. After 88 days, transcriptional profiles diverge between moderate (pH 7.8) and more severe acidification (pH 7.5) treatments, revealing sustained stress- and damage-mitigation responses under severe acidification that likely precede delayed, molt-associated mortality. We also identify candidate molecular indicators of chronic acidification stress, including carbonic anhydrase 7 (CA7).

Together, these findings provide mechanistic insight into how a cold-adapted, calcifying crustacean tolerates acidification over short time scales, while highlighting molecular signatures of accumulating stress under chronic exposure.

This manuscript is original, not under consideration elsewhere, and approved by all authors.

Thank you for your consideration,

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