Interactive effects of next-century ocean acidification and warming on the common cockle *Cerastoderma edule*

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Estuarine habitats have high ecological and economical importance but are worldwide impacted by multiple stressors. To understand the impacts of future ocean scenario's, we assessed the combined effects of ocean acidification and warming on *Cerastoderma edule*, a species that play a key role in the estuarine ecosystem. Our experimental setting comprised of two factors in a fully orthogonal experiment; temperature (ambient or elevated (+3°C)) and pH (current or lowered (-0.3 pH units)). Condition (i.e. condition index) and other physiological responses (e.g. respiration, clearance and calcification) were measured after three and six weeks of incubation. Survival of the examined adult cockles persisted high and was not affected by elevated temperature (+3°C) nor lowered pH (-0.3 units). However, the morphometric condition index of the cockles incubated under high pCO_2 conditions (i.e. combined warming and acidification) was significantly reduced after six weeks of incubation. Respiration rates increased significantly under low pH, with highest rates measured under combined warm and low pH conditions. Calcification decreased significantly under low pH while clearance rates increased significantly under warm conditions and were generally lower in low pH treatments. The observed physiological responses suggest that the reduced food intake under hypercapnia is insufficient to support the higher energy requirements to compensate for the higher costs for basal maintenance and growth in future high pCO_2 ocean.

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