

Analyses of the effect of ocean acidification on the larval development of *Crassostrea gigas*

(Análise do efeito da acidificação dos oceanos no desenvolvimento larvar de *Crassostrea gigas*)

Tese de Mestrado

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Oceans, as sinks of atmospheric CO₂, face a serious change to their natural biogeochemical cycle due to the rapid absorption of CO₂ generated anthropogenically. Ocean acidification is the common term used to describe the decrease of ocean pH phenomenon from the absorption of atmospheric CO₂ which consequently reduces the concentration of CO₃²⁻ and saturation state of aragonite and calcite. These changes challenge the adaptation of several species that depend actively on the ocean inorganic carbon cycle. To evaluate the effects of ocean acidification, we focused on the larval stage of bivalves which produce a fragile calcareous skeletal structure, very sensitive to changes in seawater chemistry. In this context, we investigate the effect of ocean acidification on sperm mobility, fertilization rate and larval viability (survival, growth and abnormalities) of the Pacific oyster, *Crassostrea gigas*, a commercially important bivalve, in controlled CO₂ perturbation experiments. The carbonate chemistry of seawater was manipulated by diffusing pure CO₂, to attain two reduced

pH levels (by -0.4 and -0.7 pH units, scenarios from IPCC data, and Caldeira & Wickett, 2003, respectively), which were compared to unmanipulated seawater. The results show high sensibility of the *C. gigas* veliger larvae to low levels of pH. In general, sperm mobility, fertilization rate, survival, growth and occurrence of prodissoconch abnormalities and protruding mantle were different on manipulated and unmanipulated pH. The impact of pH 7.4 in the fertilization and larval viability were higher than in pH 7.7. The results suggest that the reproductive success and the biological mechanisms for calcification may be prematurely interrupted when exposed to an acidified environment and that influence the viability of *C. gigas* veliger larvae, compromising the settlement.

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