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Latitudinal thermal gradient effect on the cost of living of the intertidal porcelain crab *Petrolisthes granulosus*

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ABSTRACT: Species with wide latitudinal distributions are exposed to significant abiotic gradients throughout their geographic range. Thermal gradients are especially important for ectothermic species inhabiting the intertidal zone because they affect their life history traits and fitness. In order to identify the role of latitudinal thermal gradients (specifically the exposition to different thermal maximums) in the cost of living of intertidal crustaceans, we compared specific fitness-related traits, such as body size and reproductive capacity (reproductive output, size at onset of sexual maturity and egg volume) in *Petrolisthes granulosus* individuals from 3 sites across an extensive latitudinal gradient (covering ~50% of its total distributional range): Iquique (20° 16' 12" S), Coquimbo (30° 04' 12" S) and Concepción (36° 40' 45" S). Furthermore, metabolic rate experiments were conducted to assess the energetic cost associated with high temperatures encountered in *P. granulosus* habitats. We observed that the southernmost population (Concepción) had a larger body size and presented larger size classes that did not exist in northerly populations. The latitudinal trend shown by growth and reproductive capacity traits was negatively linked to the associated thermal gradient. However, no differences were found in the relationship between energetic cost (in terms of metabolic rate) and temperatures experienced by *P. granulosus*. Thus, the patterns of body size and reproductive capacity observed for *P. granulosus* could not be explained by differences in energetic costs generated by the different thermal regimes of the study sites. Further studies should consider other environmental (e.g. quantity and quality of available food) and/or genetic factors that may be influencing the latitudinal patterns observed for body size and reproductive output in *P. granulosus*.

KEY WORDS: Cost of living · Latitudinal thermal gradient · Body size · Reproductive capacity · Metabolic rate · Crabs · *Petrolisthes granulosus* · Rocky intertidal