A subtropical to temperate transition along the east coast of South Africa shapes the thermal physiology of the truncated mangrove snail, Cerithidea decollata (Gastropoda: Caenogastropoda, Potamididae)

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The South and the East coasts of South Africa are characterised by a transition from warm-temperate to subtropical conditions. The warm-temperate region shows a distinct seasonality, while the subtropical region is generally warm and humid with mild winters. This transition in environmental temperatures may shape the physiological tolerance of ectothermic species inhabiting harsh environments, such as the intertidal zone. Two populations of the truncate mangrove snail, Cerithidea decollata (Mngazana Estuary, subtropical and Knysna Estuary, warm-temperate region) were selected to investigate the thermal tolerance (LT50) and performance (oxygen consumption) across increasing and decreasing temperatures (at a rate of 2 °C/h). The two populations differed in their upper thermal limits, with snails from the warm-temperate region showing higher values than those from subtropical region. However, animals from both populations showed a remarkable thermal tolerance, surviving temperatures over 50 °C. The thermal performance of the two populations under temperature change showed similar trends, with individuals from the subtropical region displaying higher levels of metabolism than those from the warm-temperate region. Both thermal tolerance and performance in increasing/decreasing temperatures suggested that these snails show intraspecific differences in thermal physiology. A thermal independence of metabolism over a broad thermal range was also observed, especially in the warm-temperate population. The results suggest that temperature/climatic transition between two different bioregions have shaped the thermal responses of these snails to temperature changes. Our results showed that the temperature/climatic transition between two different regions have shaped the thermal responses of snails to temperature changes. Particularly, the metabolic performances of subtropical snails suggest these individuals would be vulnerable if climatic conditions will change rapidly. This study further highlights the importance of including the effect microhabitat variability and behavioural thermoregulation when investigating the effect of climatic transition on the thermal physiology of intertidal species.