

Are mangrove crabs true intertidal ectotherms? Different thermal strategies to cope with climate change

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Abstract

Tropical intertidal ecosystems such as mangrove forests are particularly vulnerable to climate change since they are at the interface between the marine and terrestrial environments. Crabs are the most important ecological engineers among macrobenthos species in that ecosystem. They undertake different adaptive strategies to occupy several niches along a terrestrial-marine gradient. Sesarmid crabs, such as *Perisesarma guttatum*, are exposed to tidal cycles and since they are not a burrowing species, they have to cope with cycling exposition to water and air. Ocypodid crabs, such as *Uca urvillei*, are burrowers and active only during day low tides. At high tide, they burrow into their holes until the next ebb tide. Through direct observations in the field, we examined the use of time and space of these species and the thermal exposition at low tide, by recording environmental temperature. Body temperature was also measured to assess the thermal niche of the animals. Observations indicate that different strategies are employed by each species. *U. urvillei* exhibit a broad use of space and time and experience a wide variation in temperature during their feeding, displaying and homing activities. They consistently visit their burrows, and increase the frequency of visits with the incoming tide. In contrast, *P. guttatum*, show a restricted use of space, occupying consistently shaded areas and maintaining a very low activity pattern. Body temperature shows clear patterns of thermoregulation for *P. guttatum* and none for *U. urvillei*. Haemolymph oxygen saturation for the former is, nevertheless, very low in air compared to the one of *U. urvillei*. Moreover, with the incoming tides *U. urvillei* close the burrows, avoiding water inundation and thriving in air during high tide. We describe two life strategies of two species that occupy similar habitats, but display different physiological and behavioural strategies to thermal stress. These differences might underline the role of these species in the mangrove system for coping with climate induced environmental changes.

Keywords

climate change, Ocypodids, Sesarmids, thermal strategy, body temperature