Role of cuticular hydrocarbons in salinity tolerance of water beetles

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A waterproof cuticle in insects is associated with reduced water loss rates. The cuticular permeability can be modulated by changes in the composition and abundance of cuticular lipids, mainly hydrocarbons (CHC) [1]. Although aquatic insects are in general more permeable to water than their terrestrial counterparts [2], they require a relatively waterproof cuticle to prevent desiccation during aerial exposure (e.g. during dispersal among aquatic habitats) and also to minimize osmotic fluxes. Therefore, changes in cuticular CHC might play an important role in species tolerance to salinity. Our study is the first in reporting the hydrocarbon profiles of two Iberian endemic aquatic beetles, *Nebrioporus baeticus* (Schaum) (Dytiscidae) and *Enochrus jesusarribasi* Arribas & Millán (Hydrophilidae), from inland saline waters. We characterized the CHC composition (alkanes, alkenes and alkynes) and its relative abundance for each species by gas chromatograph-mass spectrometer (GC-MS). The CHC profiles of each species were compared between: 1) adults and larvae, 2) males and females and 3) adults from populations with different water salinities and adults acclimated at a higher salinity in the laboratory. Similar to the pattern observed in terrestrial Coleoptera, adults of both species had a higher proportion of alkanes than alkenes. However, alkenes were the major component of larvae cuticular CHC. No significant differences between males and females were found. CHC composition changed in relation to both habitat salinity and acclimation at a high water salinity. An increase of alkanes and alkenes proportion with salinity was observed in *E. jesusarribasi* and *N. baeticus,* respectively. The results suggest that tolerance to salinity is associated with a decrease in the cuticle permeability. Our findings contribute to a better understanding of salinity tolerance in water beetles, an issue of relevance in the context of climate change and the predicted reduction in available aquatic habitats and increase in their salinity levels.

Referencias

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