WORKING PROJECT TITLE	Do urban areas provide refugia to the harlequin beetle *Harmonia axyridis*?
CORE TEAM MEMBER	S Clusella-Trullas
ACADEMIC LEVEL OF THE PROJECT	MSc
PROJECT BACKGROUND	Climate change and invasive alien species are two primary drivers of biodiversity loss globally, and yet the integration of thermal ecology and invasion biology is just starting to get momentum in invasion biology research. Some invasive insects, such as the Harlequin beetle (*Harmonia axyridis*), have spread rapidly in South Africa and have the potential to affect negatively native insects. However, *Harmonia axyridis* mostly occurs in urban areas and is rarely found in large areas of native habitat. This project aims to explore the constraints that shape this species' distribution in urban areas. While we have gathered substantial information on the physiology, performance and thermal biology of this species under controlled experimental conditions, we know far less about the microclimatic environment that it experiences across its life stages and more importantly, how different environmental factors filter its ability to expand into natural areas.

	This project will aim to measure and assess differences in the mosaics of thermal microclimates available to this species in urban and natural areas, and account for the diversity of stage-specific habitats. The integration of available data on individual performance and the microclimates measured in this study will enable predictions of realized performance and thus, predict population fitness in a more accurate manner. We expect that microsites in urban areas act as a buffer of environmental conditions (drought, heat extremes), but future warming scenarios in urban areas may limit this role.
FURTHER READING	Roy H.E., Brown P.M.J., Adriaens T., Berkvens N., Borges I., Clusella-Trullas S., et al. 2016. The harlequin ladybird, *Harmonia axyridis*: An inspiration for global collaborations on invasion biology. *Biological Invasions* 18:997-1044. Garcia R.A., S. Clusella-Trullas. 2019. Thermal landscape change as a driver of ectotherm responses to plant invasions. Proceedings B. Royal Soc. 286: 20191020. http://dx.doi.org/10.1098/rspb.2019.1020 Woods H.A. et al. 2015. The roles of microclimatic diversity and of behaviour in mediating the responses to ectotherms to climate change. Journal of Thermal Biology 54:86-91. Davis et al. 2019. Microclimatic buffering in forests of the future: the role of local water balance. Ecography 42:1-11.
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