An inconvenient truth? Interpopulation variation but not environmental mirroring in the ecophysiology of a temperate lizard

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Interest on vertebrate ecophysiology has recently revived since this evidence is expected to inform mechanistic models to forecast species distribution, especially in the context of climate change. Within a given species, ecophysiological variation across populations depending on the environment represents a chance for adaptation/plasticity in case of environmental shift. Conversely, trait conservativeness may involve range retraction and eventually extinction. Lizards provide excellent experimental models for analysing ecophysiology in terms of adaptation and trait conservatism. Most members of the family Lacertidae inhabit temperate regions under substantial spatial and temporal variation in climate. Within this group, preferred body temperatures (Tp) correlate with several physiological optima and are considered evolutionarily conservative both in the phylogeny and at the interspecific level. However, other lizard families show intraspecific variation related to thermal environment and even to parasitisation (lizard fever). Much less is known about their water ecology, although some studies suggest that body temperature and evaporative water loss (EWL) may trade-off. Here, we tested for ecophysiological adaptation/plasticity in *Podarcis bocagei*, a temperate lizard with a poor phylogeographic substructuring and hence shallow evolutionary history. In spring 2013, we collected a total of 169 adult males belonging to nine populations from Northern Portugal encompassing the spectrum of environmental conditions used by this species (from dunes to agricultural walls, 0-1400 m a.s.l.). Lizards underwent two laboratory tests: 1) the classic Tp experiment using a photothermal gradient during 10 time intervals; and 2) the determination of EWL rates in sealed chambers during 12 hours. For each individual we also scored the prevalence and intensity of parasitisation by hemogregarines (from blood smears). We found highly significant variation and different time profiles across populations for both Tp and EWL, which remained after accounting for snout-vent length (SVL) and body mass, even if EWL was partially explained by lizard size varying within and between populations. Parasitisation also varied between sites, larger lizards tending to attain higher prevalences and intensities but, otherwise, with no effect on ecophysiology. Multivariate analyses including all variables revealed environmental influence on lizard size, EWL and parasitisation but not on Tp. Altogether, these well-supported results illustrate the complexity of lizard ecophysiology while advise against straight-forward adaptive explanations.

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