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Beyond preferred temperatures. Towards an integrated approach to lacertid ecophysiology under an evolutionary framework

Of the variables shaping the ecophysiology of lacertid lizards, undoubtedly, temperature has been the one attracting most attention. Certainly, preferred body temperatures (Tp) are well known to correlate with several physiological optima and to carry substantial phylogenetic inertia. However, much less is known on their water ecology, although some studies in other lizard families suggest that body temperature and evaporative water loss (WI) may trade-off. Both aspects together with their evolutionary trajectories are needed to wholly understand the ecophysiology and biogeography of lacertid species. By integrating thermal and water ecology data, mechanistic models of potential species distribution could be elaborated. Here, we analyse both ecophysiological traits in the *Podarcis hispanica* species complex, a group whose phylogenetic relations have been recently assessed. For a total of 14 lineages of the complex, two laboratory tests were performed: the classic Tp experiment using a photothermal gradient; and determination of WI rates in sealed chambers. Significant differences were detected for both thermal and hydric parameters even between sympatric species. Uncorrected results for thermal and hydric traits were inversely related supporting a trade-off. However, phylogenetically distant groups deviated from the common trend recommending phylogenetic correction. The importance of these results is discussed. In the near future, models based on ecophysiology may overcome some of the limitations of correlative models, especially when making inference of causation (species interactions) and when extrapolating to novel situations (climate change).

F. Gassert & A. Hochkirch

Genetic diversity of the Common wall lizard (*Podarcis muralis*) populations at their northern range margin

The common wall lizard is warmth – loving species which is mainly spread in the northern Mediterranean area. Its northern area of circulation spreads over the north of France, Luxembourg, along the Maas in Belgium, the south of the Netherlands, scattered appearances in Germany in the Eifel area and the Rhine area as far as Bonn. North of the Alps, the common wall lizard is a typical species of wine-growing regions. In Luxembourg, wall lizards are common along river valleys, whereas the species is largely absent in central and northern parts of Luxembourg. Within its native range the species shows a clear phylogeographic structure. To reconstruct the invasion history and the genetic diversity of the populations, 311 lizards (two to thirty individuals per population) were captured by hand or by noose within 31 populations of P. muralis in Luxembourg (n = 162), Germany (n = 17), France (n = 93), Italy (n = 12), Croatia (n = 9) and Belgium (n = 18). We sequenced for all populations a part of the mtDNA (cytochrome *b*) and genotyped all individuals at 10 microsatellite loci. We tested our data for the occurrence of

null alleles with Micro-Checker 2.2.3 and for linkage disequilibrium with Fstat 2.9.3. STRUCTURE v 2.3.1 was used to analyse the genetic structures among subpopulations. The admixture model was used. We chose the correlated allele frequency model. A F_{ST} based AMOVA with 9999 iterations was performed in GenAlEx 6.41 with the three STRUCTURE based genetic clusters as populations. In our case 15 clusters have been generated over all 31 populations, among 7 clusters in Luxembourg. By means of the statistical methods, a separation of the North Luxembourg and the South Luxembourg populations is shown. The immigration routes are clearly demonstrated for the northern populations by means of the mtDNA data.

T. Goldberg, E. Nevo & G. Degani

Amphibian larvae in various habitats at the southern border of their distribution

A study on six species of amphibian larvae, which grew and completed metamorphosis at fourteen different breeding sites in northern Israel, was conducted over several years. The sites included ephemeral ponds (rain pools), rock pool holes, springs and a stream. Most breeding sites studied, permanent and ephemeral habitats, contained *Salamandra infraimmaculata* (family: Salamandridae) larvae, although at different periods of the year. The larvae of *Hyla savignyi* (family: Hylidae), *Bufo viridis* (family: Bufonidae), *Rana bedriagae* (family: Ranidae), *Pelobates syriacus* (family: Pelobatidae) and *Triturus vittatus vittatus* (family: Salamandridae) inhabited mainly the ephemeral ponds. Many amphibian species, especially those inhabiting unpredictable environments, exhibited phenotypic flexibility in growth rate prior to metamorphosis and the period of metamorphic climax. This adaptive strategy allows individuals to optimize the probability of successfully emerging from the larval environment. In some breeding sites, only one species was found, e.g., *S. infraimmaculata*, while in others, mainly ponds, all or some of the amphibian species native to Israel were observed. The periods, during which some of the species inhabited the pools, overlapped. In a comparison study carried out over four years, the larval size and growth rate of individuals of the same species, residing in the same water bodies, were found to be different. We propose that this difference in development may show flexibility in larval growth and development, which enable them to survive in different habitats and hydroperiods under extreme conditions at the southern border of its distribution.

V. Gomes, A. Kaliontzopoulou & M.A. Carretero

Habitat use of congeneric lacertids in sympatry: testing for interspecific and sexual trends

Among the classic dimensions of the lizard ecological niche – space, time and food – the first is considered the main one driving ecological differentiation in lacertids. Under the ecomorphological paradigm, divergent body morphologies may be expected to reflect different microhabitat preferences. At the interspecific level, sympatric congeneric forms of similar body