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The role of chemical communication in lacertid lizards - PhD prospects and goals

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Animals communicate with conspecifics and other species through an astonishing variety of signals and displays. Which selection pressures and developmental constraints have guided the evolution of the diversity of sending and receiving system through time, has been a much-debated issue for many decades. Studying the evolution of signalling systems may contribute to our understanding of speciation, as the 'Sensory Drive Hypothesis' predicts that divergent adaptation in sensory and signalling systems to different environments can cause premating isolation between populations. The effects of the physical environment on the choice of the sensory channel and the characteristics of the signals within sensory channels have been studied extensively for visual and acoustic communication systems. Much less is known on how the signalling environment affects the evolution of chemical communication. In this PhD project, we aim to examine the evolution of the chemosensorial communication system in Lacertidae. In particular, we will investigate the role of the physical environment in shaping the diversity of signalling and receiving systems. A first study would investigate the signalling system by a family-wide comparison of the role of the physical environment in the evolution of femoral pore numbers. Additionally, we will compare femoral gland and pore morphology among lacertid species living in different signalling environments. In a second section, we will examine a number of characteristics of the femoral secretion itself, and compare this among species living in disparate signalling environments. We hypothesize that the amount and the physical properties of the secretion and the composition of the lipid cocktail will vary with aspects of the environment. At the other end of the channel, reptiles possess a vomeronasal system for processing chemical cues. We aim to explore the interspecific variation in this system for environmentally induced bias. On the basis of symmorphosis, we expect to see that species that invest strongly in the production of semiochemicals, will also be best equipped to receive them. We will compare the morphology of the tongue and the Jacobson's organ among lacertid species. We will test our hypotheses in an explicit phylogenetic context, by drawing a tailored tree from available DNA sequences and considering different models of character evolution. By taking such a comparative approach and correlate interspecific variation in the semiochemicals, the sending system and the receiving system with environmental variables, we'll try to investigate the role of natural selection in shaping chemical communication in lacertid lizards.

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