PREFACE

This book begins with a discussion on computer-animated stimuli to investigate visual communication in lizards. It then discusses the pretend play in signing chimpanzees; the evolution of TRP channels as mediators of pheromone signaling; and the role of cuticular hydrocarbon-based chemical communication in prezygotic reproductive isolation.

Chapter 1 – Visual signals that are designed for effective communication are complex. Over the years, researchers interested in the study of animal communication have employed various artificial stimuli during behavioral experiments to precisely control what the observers get to see or experience. These diverse techniques to stage animal interactions have offered an alternative to the traditional experimental methods relying on the use of live companions or demonstrators. Current technological advances allow researchers to develop realistic computer-animated stimuli of social partners with high degree of fidelity for both morphological and dynamic behavioral characteristics. Because the computer-generated animation technique offers researchers with the ability to produce standardized visual stimuli while reducing the variable behavior of demonstrators across experimental sessions, its used is becoming increasingly popular in behavioral experiments in various taxa. In the following chapter, we provide an appraisal of the computer-generated animations efficiency to stage social interactions in lizards in general and the Jacky dragon (*Amphibolurus muricatus*) in particular. The authors present relevant experimental studies in which this innovative technique has been employed to simulate social partners in the Jacky dragon to address diverse ecological important questions. In addition, they consider the future of video and animation playback in the study of lizard's communication.

Chapter 2 – Pretend play is well studied in human children and is thought to be associated with symbolic thought and theory of mind. There are many descriptions of pretend play in chimpanzees and other apes but few systematic studies. This study was a systematic sampling of videotapes for instances of pretend play in chimpanzees who have acquired American Sign Language. There were two sampling methods. The first sample of 17 hours 36 minutes and 26 seconds of videotape contained five instances of pretend play. The second sample of 50 hours 16 minutes and 41 seconds contained 16 instances. The instances fell into four different categories; substitution, attribution of function, animation, and insubstantial situation attribution.

Chapter 3 – Members of the transient receptor potential (TRP) channel family are involved in pheromone signaling, in both the vomeronasal and the olfactory systems in many species. Since the light-activated TRP and TRPL channels were discovered in *Drosophila*, TRP channel homologues have been identified in many different sensory systems across taxa. For example TRPC2, TRPM4 and TRPM5 are essential for vomeronasal and olfactory system sensing in many animals. Although these channels serve a very different function from their *Drosophila* homologues, their mechanism of action is similar to most TRP channel members utilized in the mammalian chemical senses--activation of a g-protein coupled receptor triggers opening of the TRP channel through the production of a secondary messenger, resulting the influx of cations and the depolarization of the sensory cell. Since, pheromone signaling plays a crucial role in the communication of many diverse non-human animals and TRP channel family members are essential for these systems to function, examining the difference between TRPC2, TRPM4 and TRPM5 may reveal how evolution has shaped these sensory systems. This review describes the array of TRP channels important to pheromone sensing, the evolution processes which shaped them, and their involvement in the transduction of pheromone signals.

Chapter 4 – One of the most important questions in evolutionary biology is how new species originate. In the last decades, research on speciation has focused almost entirely on the development and maintenance of barriers to interspecific reproduction (i.e. hybridization), postulated to be the major driving force of speciation. Prezygotic reproductive isolation includes mechanisms contributing to ecological, behavioral and mechanical isolation between species, leading to different degrees of gene flow reduction or complete interruption. Therefore, any cues or signals capable of accurately conveying information about species, sex and reproductive status have the potential to contribute to prezygotic reproductive isolation between diverging

species. Albeit studies on animal signals have been mostly devoted to visual and auditory communication, empirical evidence has accumulated that olfactory communication (i.e. chemical signaling) also plays a major role in animal communication systems. In particular, insects have exploited this type of signaling as their primary communication mode. In the following chapter, we present an overview over the contribution of chemical communication to prezygotic reproductive isolation in exemplary insect species with a particular emphasis on the variation of cuticular hydrocarbons between species and its impact on mate preference and assortative mating.