Title:	Examining the effect of environmental factors on acoustic signalling of a nocturnal ensiferan insect, Acanthogryllus asiaticus
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Abstract:	Acoustics is one of the many sensory modalities for communication used by animals, both vertebrate and invertebrate, towards various life functions. Communication itself occurs under non-ideal conditions that are determined by the features of the habitat of animals. Rapid urbanization and increased anthropogenic activities that have substantially altered the natural surroundings of animals through changes in three major environmental factors, light, noise and temperature, which form the core sensory backdrop for most organisms. Given the vital role that the environment plays in shaping the behaviour and signals of animals, it becomes critical to examine the impact of altered sensory environment on animal signalling to understand the broader context of signal evolution. In my thesis, I have focused on studying the influence of these three key environmental factors: light, noise and temperature on acoustic signalling of a nocturnal ensiferan insect, a field cricket, Acanthogryllus asiaticus. In relation to this, I examined the temporal variation of calling behaviour, structure and function of calls used in intersexual interactions and whether acoustic signals are reliable indicators of the morphological traits of the signaller. I then examined the impact of ambient light, both natural and artificial, on the behaviour of nocturnal animals. I also investigated the role of melatonin in regulating calling rhythmicity. With respect to noise, I examined the problem of conspecific acoustic masking interference in male field crickets and investigated the strategies they use to solve it. However, ambient noise may be abiotic and in particular, anthropogenic and this is known to affect acoustic signalling adversely. I investigated the effect of road traffic noise on the acoustic signals of A. asiaticus that were exposed to it over long and short-term. Finally, I investigated the effect of ambient temperature on life-history traits and calling behaviour in A. asiaticus. My major findings suggest that acoustic signals are a reliable indicator of body size and that unlike natural light levels, artificial light significantly impacts signalling in this species. Constant exposure to light results in disruption of calling rhythms, which can be restored by melatonin. With respect to noise, I find that the strategies males use to counter conspecific acoustic masking interference are different from those that are known to be used in heterospecific masking avoidance. In particular, my findings highlight that in the case of conspecific masking, unlike heterospecific masking avoidance, natural spacing of signallers and active avoidance of maskers at fine temporal level of calling plays a crucial role. This elucidates that while some problems are common in the animal kingdom, the solutions may vary greatly. I also find that increased ambient noise in traffic-prone areas severely impacts signalling in this species. Finally, my work highlights the critical role of temperature in determining not only life history traits but also acoustic signalling in nocturnal ectotherms. Overall, my thesis provides a holistic understanding of how three different environmental features, light, noise and temperature impact various aspects of the biology of an insect, including its behaviour, acoustic communication and life-history traits, thereby providing evidence for the ecological consequences of sensory pollution.
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