

Evolutionary Ecology of Antipredator Strategies in Motion

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17/12/2019, 12:00, Institute seminar room, Sede Boqer Campus



Animals exhibit a tremendous diversity of color patterns, and research over a century has identified numerous ways in which animals use these colorations to reduce predation. However, most studies have focused on prey colorations that reduce predation risk when the animal is still. Because it is difficult for an animal to remain undetected during movement, a new challenge is to understand how colorations lower predation risk in moving prey and the conditions favoring these alternative forms of defense. In this talk, I will highlight the underappreciated antipredator role of two conspicuous colorations (conspicuous, at least to human observers) – high contrast stripes in

lizards and dynamic change of coloration in moving prey such as in butterflies and fishes. To this end, I have conducted a series of virtual predation experiments (using humans) and employed a range of tools (e.g. experimental psychology, comparative phylogenetic methods) to understand the mechanisms by which these colorations work and the factors affecting its evolution.

First, I found longitudinal stripes such as those found on the anterior body parts of many lizards, may redirect attacks away from themselves during motion towards less vulnerable posterior parts, for example, the autotomous tail. By integrating an experimental and phylogenetic comparative approach, I also show that stripes might be effective in shorter lizards than in longer ones.

In a separate set of experiments, I found targets with a dynamic color change to lower capture success when compared to targets without color change, providing evidence for the antipredator role of dynamic color change during motion.

Psychophysical experiments further revealed that stripes primarily work by hindering accurate perception of speed, while dynamic coloration prevents accurate estimation of prey's position. Overall, my studies highlight how prey animals may exploit the limitations in predator sensory systems to avoid predation during movement and open new avenues for future research that could be focused on specific prey-predator systems.



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