Landscape use by prey: Bottom-up regulation prevails under reduced perception of risk

Filipe Rocha[1], Milcíades Chicomo[1], Fernanda Lages[2], and Pedro Monterroso[3]

[1]BIOPOLIS Association - Research Network on Biodiversity and Evolution Biology
[2]Instituto Superior Politécnico da Tundavala (ISPT)
[3]CIBIO/InBio, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade do Porto.

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Abstract

Proactive antipredator behavior results from a mental construct of perceived predation risk, and drives prey's strategies to avoid being killed while minimizing constraints to their activities. Under this reasoning, resource specialists may suppress antipredator strategies to access scarcely available key resources, while proactive antipredator behavior should be privileged by generalists or when resources are abundant. We quantified the relative effects of predation- (top-down) and resource-driven (bottom-up) constraints to spatiotemporal patterns of landscape use by a prey community in a dynamic system under low predator abundance, and investigated how prey manage the risk posed by predators with different hunting strategies. We fitted Royle-Nichols co-abundance models to camera trapping data collected between 2017 and 2019 in Bicuar National Park (Angola) to assess spatial association/segregation across predator-prey dyads, while accounting for the effects of water and food availability during dry and wet seasons. We further estimated pairwise seasonal differences in diel activity overlap between predator and prey.Our results depict a generalized pattern of predator-prey spatial co-abundance, independent of predator's hunting strategy or prey's importance in the predator's diet, even overriding the effects of water and forage availability. Further, we found prey to have higher activity overlap with the ambush than with the cursorial predator, with little influence of the season or prey preference. We failed to detect spatiotemporal proactive antipredator responses either towards the cursorial or ambush predator. The community-wide predator-prey association patterns we found support that predation pressure is insufficient to displace prey from their preferred habitats or to adjust their endogenous clock, and support predominantly bottom-up regulated behaviors. We suggest that, in landscapes where predator density is low, limited perception of risk may prevent the employment of proactive antipredator behavior, likely relegating prey to rely on reactive responses to short-term predation risk.

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