Impact of Environmental Conditions on Predator Responses in Tadpoles

Behavioral plasticity is a valuable capability, especially in unpredictable environments. However, an organism's ability to behaviorally respond to one environmental factor may be constrained by another, seemingly unrelated environmental factor. For frogs, a well-studied phenotypically plastic response relates to hatch timing. Embryos have been demonstrated to hatch in response to predators, certain abiotic conditions and changes in resource availability. In this study, the authors have examined the impact of environmental conditions on hatch timing in the neotropical treefrog, *Dendropsophus ebraccatus*. This frog lays eggs both above the water (attached to leaves) and directly in the water, exposing these eggs to different desiccation risks. The impact of desiccation on predator-induced hatching and escape success from two predators (terrestrial *Azteca* ants and aquatic tadpoles) was investigated. In response to both predators, eggs hatched prematurely (up to 67% earlier than unpredated clutches). however, when exposed to desiccating conditions, egg clutches subjected to attacks from the *Azteca* ants suffered lower predator escape success than those from hydrated clutches of either predator treatment. Indeed, desiccated eggs recently placed in the water showed no difference in early hatching success relative to eggs eggs having been submerged in water long term. The reduction in predator escape from desiccated clutches probably impacts recruitment in wild populations, and highlights the importance of other environmental factors in mediating phenotypically plastic responses.

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Impact of Agricultural Land Use on Stream Dwelling Turtles

Anthropogenic modifications to riparian habitat can have serious consequences for stream dwelling organisms. In this study, the authors examined whether the diversity and abundance of freshwater turtles differed between agricultural riparian zones, and those that had been undisturbed or restored. This study was conducted in the Lower Flint River Basin (LFRB) in south-west Georgia, USA, which possess a high diversity of freshwater turtles. In total, nine species were encountered, from two streams within the LFRB. Diversity (species evenness) was positively correlated with the amount of undisturbed landcover in the riparian habitat. However, associations between riparian habitat and abundance differed between species. For some species, abundance increased in less-forested, more disturbed sections of stream, but for the state-protected and endemic *Graptemys barbouri* (Emydidae), abundance was lowest in disturbed riparian zones. The impacts of agriculture on species diversity could relate to the availability of prey species in these stream sections which are sensitive to runoff. This study indicates physical alterations such as increased sedimentation or a reduction in nesting sites may reduce the number of species that can be supported in a stretch of stream.

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Artificial Water Points Assist Cane Toads in Invading Arid Zones

In many cases, biological invasions occur from "invasion hubs," satellite populations that once established, facilitate expansion. By concentrating management effort on these invasion hubs, the spread of invasive species may be contained. While there is good theoretical support for this management strategy, it has rarely been practically demonstrated. Artificial water points (AWP) have been installed by humans throughout arid landscapes, increasing the availability of standing water. The increase in AWP has potentially opened up many otherwise inhospitable landscapes to colonization by invasive species. In this study, the authors have examined the importance of AWP in the invasion of northern Australia by the Cane Toad, *Bufo marinus*. They experimentally excluded toads from some AWP with fencing and by hand-counting the toads trapped within the fences and comparing toad abundance in areas with and without access to AWP, they demonstrated that AWP do provide dry season refuges for the toads as well as provide a resource subsidy. The authors suggest that AWP operate as invasion hubs for cane toads in arid Australia. The authors also modelled the impact of excluding toads from AWP throughout arid Australia, and predicted that this would reduce the area across which toads could colonize by 38%. This study highlights the importance of anthropogenic landscape modification in the spread of invasive species and illustrates the potential for controlling the spread of these species through cordoning off invasion hubs.

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