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***Quantitative genetic analyses of risk-induced hatching reveal limits to plasticity of inducible defenses***

Inducible defenses are paradigmatic examples of adaptive phenotypic plasticity that often mediate ecological interactions. We have studied the heritable basis of hatching plasticity in two amphibian species using quantitative genetic analyses. Amphibian embryos are exposed to many hazards, and risk-induced alterations of hatching timing are effective inducible defenses against predators and pathogens in several species. First, we analyzed genetic variation in hatching acceleration of embryos of the American toad (*Bufo americanus*) in response to the presence of pathogenic water mold. We collected adult toads from vernal pools in Lynn Woods (MA, USA) and followed a nested breeding design (North Carolina I) to obtain a series of paternal halfsibs and maternal fullsibs. We observed low levels of additive genetic variance but a significant non-additive component of plasticity in hatching timing. Second, we analyzed genetic variation in hatching acceleration of embryos of the red-eyed treefrog (*Agalychnis callidryas*) in response to simulated predator attacks. Using a breeding colony of wild-caught frogs from Limon (Costa Rica), we used a partial diallel breeding design to obtain a series of maternal and paternal halfsibs, and obtained broadly similar results to the preceding study. Both studies indicate a clear pattern of reduced genetic variation for the induced defensive phenotype early hatching than for uninduced, spontaneous hatching. This pattern contradicts most other studies on induced defenses and may be common for plasticity in the timing of ontogenetic switch points, where development imposes asymmetric limits to plasticity.