Early development and the honesty of aposematic signals in a poison frog

Submitted by

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Juvenile of *Dendrobates auratus* at the study site in Santa Fe de Veraguas, Panama. Photo: Eric Flores, 2009.

Abstract.

The causes and consequences of variation in aposematic signals during immature stages are not clearly understood. This thesis explores the effects of early environment on the expression of aposematic signals in the green and black poison frog (*Dendrobates auratus*), and the consequences of variation in such components in the wild. It also explores how aposematic expression relates to levels of chemical defences in immature froglets. Embryos and larvae of poison frogs in the genus *Dendrobates* are known to be darkly pigmented. This thesis reports for the first time polymorphism in egg pigmentation in *D. auratus* and ontogenetic colour change through development reverting to a normally pigmented phenotype; however whether this pigmentation results from constraints or has adaptive consequences remains unclear. Evidence on how immature individuals allocate resources to growth and warning signalling is scarce. Experimental results in this thesis show that food supply during early environment affected body size and signal luminance in post-metamorphic froglets. Therefore the relative importance of these traits in relation to predation risk was further tested, using artificial prey in a field experiment. The results indicated that rates of attack by birds correlated negatively with body size, and on the contrary survival of artificial prey was independent of signal luminance. I therefore tested the hypothesis that in the wild larger, relatively well-nourished juvenile frogs are chemically better defended. I found that in fact larger juveniles are at a selective advantage conferred by their greater foraging efficiency and their superior levels of chemical defences. Overall, these results shows plasticity in aposematic traits in relation to early environmental nutrition in *D. auratus*; and suggests that acquiring large body size and similar integument colour as to adults are key determinants for survival during the early stages of their terrestrial life.

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