**Predator decision-making and the evolution of imperfect Batesian mimicry**

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Batesian mimicry is a fascinating anti-predator adaptation whereby palatable prey species (mimics) have a phenotype that resembles the phenotype of a defended species (models). Some examples of Batesian mimicry are notable because of how well the mimic’s phenotype matches the model. Other examples are notable because the match is so poor that it is unclear why any predator would be fooled. This gullibility on the part of the predator is, however, critical to the initial evolution of mimicry and to the evolutionary persistence of imperfect mimicry. Understanding the evolution of mimicry requires an understanding of predator cognition and decision making. I will discuss recent theoretical and empirical work that explores the conditions that favours the evolution of gullible predators. Signal detection theory (SDT) has been the standard model of predator decision making in mimicry systems. SDT predicts that predators will avoid even poor mimics when the mimics are relatively rare or otherwise unprofitable and when the model is particularly aversive. Comparative data from hoverflies shows that mimetic fidelity is negatively related to mimic body size (i.e., profitability), which supports the SDT model. We have expanded the basic signal detection model to incorporate various ways that predators can increase their ability to discriminate between models and mimics. For example, predators can use multiple cues, spend more time inspecting potential prey, or allocate more attention to the task. These expanded models suggest various additional cognitive and ecological factors that would lead to the evolution of gullible predators.