Predator cognition and the evolution of anti-predator defence

Tom Sherratt, Department of Biology, Carleton University

Over the past century we have learned a great deal about how anti-predator defences, ranging from mimicry to startle, serve to protect would-be prey from being eaten. However, it is far less clear why some species have evolved one form of anti-predator defence and other species have evolved another. For example, why have some species of harmless hoverfly evolved a close similarity to their stinging hymenopteran models, but other species only a crude resemblance? Put another way, why doesn't natural selection improve the fidelity of these imperfect mimics? Likewise, if the startle signals of moths are so darn good at intimidating avian predators, why don't all moth species evolve them? Why have some caterpillar species evolved eyespots but not others? In this talk I present some examples of variation in defences within phylogenetic groups and describe experimental tests of hypotheses to explain this variation. I argue that much of this variation in anti-predator defences is a consequence of adaptive decision making by predators, who ultimately determine the success of any defensive trait.

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