Disruptive colouration and background pattern matching in insect crypsis

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Analyses of crypsis generally focus on how well an individual represents a random sample of the background, yet camouflage is also achieved by breaking up the outlines of an animal: 'disruptive colouration'. Although disruptive colouration works in combination with background matching, it is logically distinct. The theoretical predictions were tested with respect to avian vision in field experiments involving artificial 'moths' composed of printed card ('wings') with mealworms (edible 'body'). In experiment 1, 'moths' were uniformly coloured black or brown, or had background-matching patterns consisting of brown and black, placed either in the centre of the moth, randomly, or at the edges (disruptive). Moths were placed along transects on oak trees and 'survival' (detection rate) in the face of bird predation was monitored over 24 h. In experiment 2, we tested the prediction that strongly contrasting pattern elements provide greater disruptive effects. Each moth comprised two colours, occurring equally frequently on oak bark, and exhibited either disruptive markings, random markings, or was uniformly coloured as the average of the colour pairs. On the basis of survival analysis of the data, we assessed whether both background matching and disruptive patterning conferred significant, independent survival benefits.