
Moonlight selection on the plumage coloration of barn owls

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Abstract

Evolution of colour polymorphism is linked to environmental light conditions. If the role of variation in diurnal light has been largely studied, the evolutionary implications of its nocturnal counterpart, moonlight variation, are barely known. The lunar cycle results in repeatedly changing light conditions, setting the ground for the coexistence of alternative colour forms. Using a long-term monitored population of barn owls, we investigated the consequences of moonlight variation on food provisioning and fitness of owls with white-to-rufous plumage coloration. Rufous owls provided less prey to their nestlings during full-moon nights than during new-moon nights, which associated with lower body mass and survival of their offspring. Moonlight did not affect food provisioning in white owls. However, contrary to rufous owls, the survival of the white owls' youngest nestlings was favoured by full-moon days. In the laboratory, we investigated the antipredator behaviour of the barn owl's common prey, the common vole, under full- and new-moon light conditions and when exposed to simulated attacks of white and rufous owls. Both white and rufous owls were more easily detected by voles under full-moon light conditions but white owls induced longer freezing times on rodents under full-moon light conditions. By inducing longer freezing times in voles, white owls may see their hunting success enhanced during full-moon nights. This could palliate the negative effect of increasing moonlight levels on hunting success and fitness as observed in rufous but not in white owls. It also suggests that the rare white coloration of barn owls might have evolved to exploit moonlight variation and prey sensory biases. Although our results show that the lunar cycle alone cannot explain maintenance of colour variation in barn owls, they highlight that moonlight can select for the coloration of nocturnal species, altering the fitness benefits derived by alternative colour phenotypes.

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