Torpor-Migration convergences and emerging rules about adaptation to seasonality

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Abstract

A component of climate change is the decrease in the predictability of climate, with an increase in climatic variations between years, and more unusual (extreme) events. Organisms capable of rapidly modifying their characteristics (phenotypic flexibility) in response to changes in environments are likely to be endowed with physiological and behavioral mechanisms that make them less sensitive to climatic anomalies. I will explore this hypothesis from a synthesis of the literature on the regulation of two extreme adaptations of endothermic vertebrates to seasonal climatic harshness: torpor use and migration. Hererothermic endotherms are able to reduce their metabolism and body temperature during episodes of energy stress, such as reductions in food availability, either optionally from one day to the next (daily torpor) or in a sustainable manner (hibernation). A completely opposite strategy is to migrate, i. e. to avoid the energetic constraint by movement, again either optionally (partial / differential migration) or systmatically (long-distance migration). A systematic comparison of torpor and migration is currently missing, although both seasonal adaptations involve strikingly similar physiological convergences. I will present a review of torpor-migration main convergences (and divergences), with extensions about their potential role (particularly as source of phenotype flexibility) for the compensation of climate-driven environmental fluctuations.

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