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Summary

This study looks at different aspects of migration in the Northern Wheatear (*Oenanthe oenanthe*), a long-distance migrant bird breeding across the whole Holarctic region and wintering in sub-Saharan Africa. The diversity of migratory routes the different populations fly presents the interesting question whether between populations there are different adaptations to environmental challenges and, if so, are they endogenously determined? To look for endogenous regulation of migratory traits like seasonal rhythms of body mass change and nocturnal activity and orientation, I compared birds from different populations kept under the same constant conditions in a "common-garden" experiment. The results clearly show that populations contending with different migratory routes have evolved differences in their behavioural responses, e.g. Icelandic birds, which have to fly a considerable distance over the North Atlantic sea, store more fuel reserves than continental populations which travel shorter distances. The orientation experiments revealed population-specific directional choices, but these were not in line with expectations, leading me to conclude that inexperienced birds need some additional external cues in order to calibrate their magnetic compass. These results outline the genetic basis which underlies the migration strategies of the Northern Wheatear, which I have demonstrated possesses an innate disposition for migration. However, this disposition does need to be calibrated by external factors such as photoperiod, celestial cues and perhaps other factors which as yet are still unknown. In addition to the common-garden experiments, I also sampled feathers from wheatears captured at different breeding and wintering sites and analysed their isotopic signatures in order to deduce evidence of migratory connectivity. Although some populations could be tentatively assigned to the respective wintering quarters, the use of isotopic markers for the analysis of connectivity in the wheatear remains problematic. Finally, metabolic measurements of birds were taken from three different populations in order to assess whether they have evolved different basal metabolic rates as an adaptation to cold. I compared three populations breeding at different latitudes and the results show that Icelandic birds are adapted to the colder temperatures in their Arctic range by having higher metabolic rates at colder temperatures. The use of the Northern Wheatear as a model species for an integrative approach to the study of bird migration combining field studies and experimental work proved promising in looking at different aspects of this species' migration strategies.