

# Genetics of cross-continental migration in ten-gram songbirds

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Many insect-eating songbirds build their nests and reproduce in Northern hemisphere. Each winter temperature drops and insects are no longer available. Bird populations that have been able to temporarily move south to find food, and then return to North when winter is over, have survived and left descendants. Over millions of years natural selection has streamlined this behaviour. From 10 000 extant bird species some 40 % undergo seasonal migrations. That constitutes 50 billion individual birds. Small songbirds migrate alone over nights, even young birds that have never migrated before. This leaves no room for doubt that migration direction and timing is inherited and controlled genetically. Even though migration has been extensively studied, many fundamental questions including genetic basis of it remain unanswered.

This study is focused on willow warbler (*Phylloscopus trochilus*), a small songbird, that breeds across whole Northern Eurasia from coast of Pacific to coast of Atlantic and overwinters in tropical Africa. West and Central European willow warblers migrate to West Africa flying SSW, North and East European birds in contrast migrate to East and South Africa and fly SSE. Willow warblers in Europe have been studied thoroughly, whilst very little is known on NE Siberian populations. Previous studies have established that there are only two relatively small genetic regions that can be used to identify North/East European and West/Central European willow warblers with high accuracy. In this study I compared North East Siberian willow warbler gene sequences at these differentiated sites and found no differences from North European populations. In addition, I examined variation in CLOCK gene (it has been suggested this gene is linked to timing of migration). Surprisingly I found that CLOCK gene does not differ between European and Siberian willow warblers.

One possible explanation in lack of diagnostic differences in sequences between willow warblers with different migratory behaviours is that it's the wintering location itself, that is inherited. Not the route and timing of flight. To find out we need to start with tracking more songbirds and documenting exact migration routes and exact wintering sites!

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