

# A population genetics study of Pale-winged Starlings, *Onychognathus naboroupp*, using novel microsatellite markers.

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## Abstract

Recent research into starling species has revealed the existence of vocal social markers and a link between song temporal structuring and social organisation. The aim of the present study was to develop a genetic tool for understanding the population structuring and behaviour (social/parental transmission) and mating in Pale-winged Starlings (*Onychognathus naboroupp*), a songbird which is found in arid areas of southern Africa. Using next-generation sequencing, microsatellite markers comprising six dinucleotides, eighteen trinucleotides and twenty-four tetra-nucleotides specific to the Pale-winged Starling were isolated and developed. A total of 77 birds were sampled from the Augrabies Falls Nature Reserve in South Africa (n=53) and the Ai Ais-Richtersveld Transfrontier Park resort in Namibia (n=24), respectively. Fifteen polymorphic microsatellite markers were genotyped. The statistical programme STRUCTURE revealed four different genetic clusters within the two populations. There is low genetic divergence (mean  $F_{st}$  value of 0.01) between the two populations, which is supported by the mean number of effective migrants (22.45) between the populations. ML-Relate data analysis indicated that all individuals sampled from both populations have relatives within and across the two populations with three exceptions in the Augrabies Falls Nature Reserve region. Birds from either population migrate and join the other population maintaining gene flow between the two populations. Each population has a high degree of genetic diversity present between individuals. There is little inbreeding and high allelic richness in both sampled populations, which will allow them to adapt to future environmental changes. The developed microsatellites have inferred information for the success of this species. Social structure, relatedness and behaviour were inferred and regardless of genetic relationships these birds maintain a stable social environment and harbour strong social bonds between same and opposite sex group members as well as mates.

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