The impact of social structure and genetic diversity on conservation of Malagasy birds

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Hosting institution: University of Bath

Project description: Madagascar is one of the most important global biodiversity hot-spots although the origin of much of this diversity is controversial. Understanding the origin of Malagasy biodiversity is essential to direct conservation efforts. Madagascar hosts an outstanding proportion of endemic species exhibiting endemic genera, families and orders. However, due to rapid human expansion and deforestation, many endemic species are endangered or at risk of extinction.

In a previous study we found that social structure predicted genetic differentiation in Malagasy plovers (Charadrius spp): monogamous species exhibited spatially well-structured populations whereas polygamous species exhibited weak spatial structure (Fig 1). This result is significant because it suggests that social structure may correlate with genetic differentiation, and thus with both speciation and, potentially, extinction. However, this novel result has limitations: (i) it included only one species pair the monogamous Madagascar plover and the polygamous Kittlitz's plover, (ii) genetic differentiation is influenced by numerous factors and these could confound the influences of social structure.

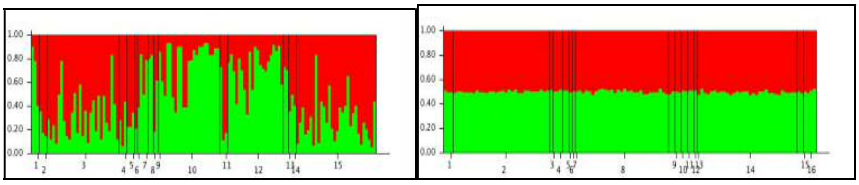

Fig 1. STRUCTURE plots for Madagascar plover (left) and Kittlitz's plover (right, Brede et al. unpubl).

The NERC studentship will build upon this pilot result, and expand the test of this hypothesis using 10 Malagasy bird species that cover a broad range of taxa including both passerines and non-passerines. Using microsatellites and mtDNA sequencing the student will test whether mating systems and dispersal behaviour predict genetic differentiation. Mating system will be established using DNA profiling. In addition, the student will use landscape genetic techniques to assess how potential geographic barriers and behavioural traits interact to influence genetic differentiations. This project is facilitated by ongoing collaborative projects between Prof Székely, Prof Bruford and Malagasy scientists. Prof Székely will direct fieldwork in Madagascar, and coordinate DNA sampling. Malagasy authorities have provided permission for captures and DNA sampling in previous years. Molecular genetic methods have been tested in Prof Bruford's lab, as well as landscape genetic techniques.

The Studentship is significant for three reasons. First, it will investigate a hypothesis relevant for mating system evolution, breeding systems and sex roles. These themes lie at the core of Prof Székely's research. Second, it will contribute to understanding speciation; especially important in speciation powerhouses such as Madagascar. Thirdly, it will use genetics to

assist biodiversity conservation by providing vital data on behaviour, ecology and genetic diversity of Malagasy birds. This is a core theme of Prof Bruford's research agenda.

Training opportunities: The student will benefit from training in three distinct fields. 1. At Bath, she/he will be trained in field biology, behavioural ecology and mating system evolution. 2. At Cardiff, the student will be trained in molecular ecology and conservation genetics. 3. At both labs, the student will be exposed to biodiversity conservation theory, application and practical conservation. In Cardiff the student will also complete our well-established course in R-based statistical modelling.