

## **Comparative genomics of wild avian species**

### **Supervisors:**

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**Hosting institution:** University of Bath

**Project description:** What at the molecular level underlies the evolution and the diversity of mating systems? To a large extent, the genetic bases of social behavioral variation among individuals and species remain largely unknown. Bird species are an ideal model to investigate the molecular basis of breeding patterns as they have diverse and ecologically well characterized mating systems. In this project we propose to investigate the neuro-genomic basis of mating system variation, to gain insights into the evolution of mating systems. We propose to sequence brain transcriptomes of 3 males and 3 females in two populations of Kentish Plovers with different mating systems: 1) one plateau population in Qinghai, China with the mating system of monogamy; 2) one population in temperate zone in Bohai Bay, China with the mating system of polygamy. These data will augment existing transcriptomics data from 2 additional plover populations: one monogamous and another polygamous. We hypothesise that levels of expression and sex-biased gene expression should be directly influenced by mating systems with higher sex biased gene expression in polygamous populations with higher sexual selection compared to monogamous ones. Candidate genes whose expression is significantly different in the polygamous but not the monogamous population will be identified. We will also investigate the nucleotide divergence between the different mating systems. We will identify the SNP loci which are highly differentiated among the experimental groups and pinpoint the SNPs which are possibly related to the mating behaviors. The results obtained from this study will aid uncovering the genetic pathways associated with complex behaviours.

**Training opportunities:** This multidisciplinary project will involve close collaboration between the Functional Genomics Lab and Biodiversity Lab at the University of Bath.

As a result the student will have the rare opportunity to get training in both field work and the use of genomic techniques all of which are well established in the two collaborating labs.

Field work will provide the student with expertise in identification and trapping birds in the field, ringing, good practise in obtaining morphometrics data and blood samples in a safe manner. The student will also learn behavioural ecological methods including behavioural observations.

Genomics training will also acquire expertise in the use of top end software environments for genome assembly and next generation transcript data including Shrimp aligner, Oases and Velvet.

In addition, the student will receive training in a variety of programming languages including R statistical language, python scripting and MySQL database management For data analyses.

The student will benefit from working in Linux based high performance servers in the research group.