

OWEN OSBORNE



“ I first became interested in plant science when I learnt about the fascinating evolutionary history and complex genomics of plants and I am now particularly interested in the areas of plant evolutionary and population genomics. ”

First Degree

BSc Biology
University of Bristol
Graduated July 2011

Sainsbury Undergraduate Studentship (2010-2011)

Vacation Research – Investigating the roles of selection and gene flow in *Senecio* speciation and hybridisation on Mount Etna
University of Oxford
Supervisor – Dr Dmitry Filatov
Mentor – Professor Claire Grierson

PhD

Sainsbury PhD Studentship

The genomic basis for speciation and local adaptation in *Senecio*.
University of Oxford
Supervisor – Dr. Dmitry Filatov
Starting October 2011

Summary of Research Project

The genomic basis for evolutionary change, whether evolution within lineages or the division of these lineages in speciation events, remains remarkable poorly understood. Recent discoveries in functional genomics, such as epigenetics and microRNA, have made it clear that genomes are far more complex and dynamic than was previously thought. The details of how these extra layers of complexity relate to adaptation and speciation, however, is yet to be elucidated. During my PhD, I will use high-throughput sequencing and population genomic analysis to investigate how selection has acted on the genomes of three *Senecio* species, focussing both on coding regions and on microRNAs and their targets. I will collate my findings with phenotypic, expression, promoter region and epigenetic data from both the Filatov lab and our collaborators to identify genome-wide patterns of selection. Overall I will aim to fulfil three main objectives:

1. To determine (as part of the wider collaboration between the Filatov lab and our collaborators), the relative contributions of selection on regulatory and coding regions to speciation and local adaptation in the three species.
2. To investigate, for the first time, the role of microRNAs and their binding sites in speciation and local adaptation.
3. To elucidate genome wide patterns of gene flow and divergence between *S. aethnensis* and *S. chrysanthemifolius* and identify potential 'speciation islands' responsible for the maintenance of species boundaries, as well as interspecific selective sweeps which have reduced local divergence.

The two Sicilian taxa *S. chrysanthemifolius* and *S. aethnensis*, and their British hybrid derivative *S. squalidus*, represent one of the most illuminating systems in which to study hybridisation, speciation and local adaptation. The use of next generation sequencing and bioinformatic techniques to examine them has the potential to provide remarkable new insights into how evolution works at the level of genes and genomes.
