

The dynamics of hybridisation between an avian island endemic and a recent coloniser

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Hybridisation is common but variable in frequency



76% dabbling ducks in Britain







25% vascular plants in Britain

6% European mammals

1% Drosophila worldwide

Mallet 2005 TREE



Darwin's finch "Big Bird"

Heliconius butterflies

speciation



TIME

Consequences of introgression

- Homogenising effects
 - 'reverse speciation'
 - genetic swamping of a lineage
- Constructive effects
 - Adaptive introgression transfer of beneficial alleles













Norfolk Island Zosterops

HYBRIDIZATION IN NORFOLK ISLAND WHITE-EYES (ZOSTEROPS)

FRANK B. GILL

The purpose of this paper is to call attention to two additional hybrids of *lateralis* \times *tenuirostris* and to suggest that hybridization between these two species resulted immediately after Z. *l. lateralis* colonized Norfolk Island in 1904, but has since diminished or even ceased.

Three specimens taken in 1912 & 1913: intermediate in size coloration and wing formula

RAD-seq data of recent silvereye colonization sequence (Sendell-Price et al. 2021 Mol. Ecol)

SNZ

NNZ

CI

'Recent' natural colonisations

Human intro

TAH

Mainland

ML

TAS

Methods

- Field capture of birds using mistnets
- Norfolk Is: 15 silvereye & 7 slender-billed white-eye
- North Island New Zealand: 12 silvereye
- WGS: Illumina Novaseq 6000 platform; paired end 150bp reads; ~ 5x sequencing depth
- Used the scaffold-level assembly of Zosterops lateralis melanops to align reads; order and orientation of scaffolds ascertained from synteny with Taeniopygia guttata (zebra finch)
- > 15 million SNPs for downstream analysis



Testing for introgression



D-statistics for introgression
ABBA & BABA patterns expected *equally* under incomplete lineage sorting D = (sum ABBA – sum BABA) (ABBA + BABA)

 Positive D = excess of ABBA site pattern



How is introgression distributed across the genome?



- *f_d*: measures the proportion of introgression between P3 and P2
- 50kb windows with 10kb sliding step
- Orange dots: 50kb window outliers indicating introgressed windows
- Candidate genes: bill and plumage



Timing and direction of introgression



1. Ongoing gene flow between the coloniser and endemic at a constant rate



t div

SC

t_{RI}

N _{Z.ten}





Next steps with current dataset

- 5x coverage is moderately low; redo analysis with genotype likelihoods rather than direct calling of SNPs
- Complement with some higher coverage sequences (20-30x) to more confidently impute and phase sample genotypes
- Are introgressed regions favoured by selection?
 - Selection scans to ask if introgression is potentially adaptive

Future work

- WGS of museum specimens
 - two Norfolk endemics pre and post silvereye colonization
 - putative hybrids
 - time series for silvereyes from 1904
- Explore the consequences of changing population sizes on the degree and direction of hybridisation
 - Genomic Landscape of Divergence (GLaDs) model (Quilodran et al., 2020)
- Is a signature of hybridisation evident in much more ancient silvereye colonisations?





Acknowledgements

- John Fell OUP Research Fund, Oxford
- Department of Zoology, Oxford
- Ashley Sendell-Price
- Andrea Estandía
- Bruce Robertson
- Jessica Ody
- Kristen Ruegg
- Tim Coulson
- Jiro Kikkawa
- Members of the Clegg Lab, Oxford

