

Brood Parasitic
Finches

Estrildid Finch Host
Species



Pin-tailed whydah
Vidua macroura

Common Waxbill
Estrilda astrild



by Justin Schuetz

Indigobirds



Indigobird species...

- ✧ ...are highly host-specific, most species parasitizing a single estrildid finch host species
- ✧ ...mimic the nestling mouth colors and patterns of their respective hosts

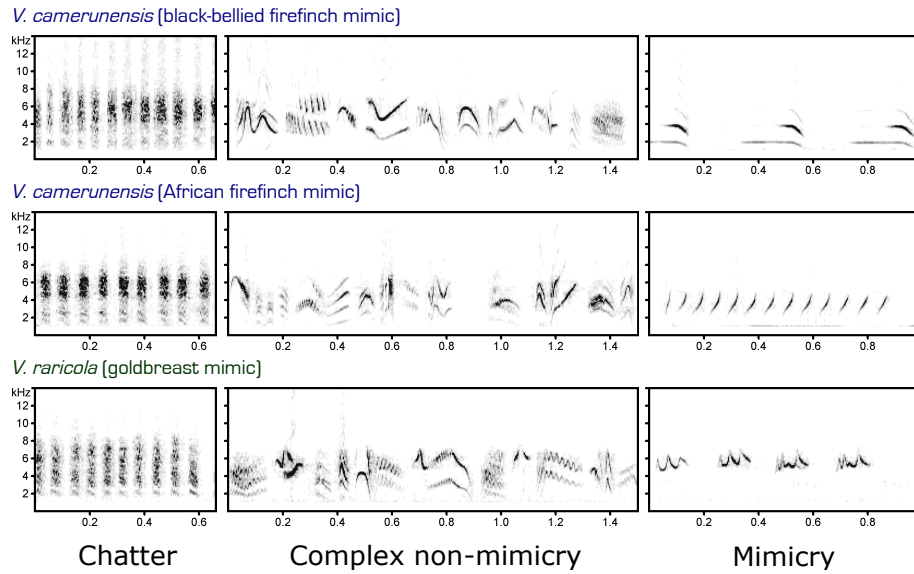


- ✧ ...are morphologically distinct (in juvenile mouth markings and adult male morphology) but only slightly differentiated in neutral genetic markers

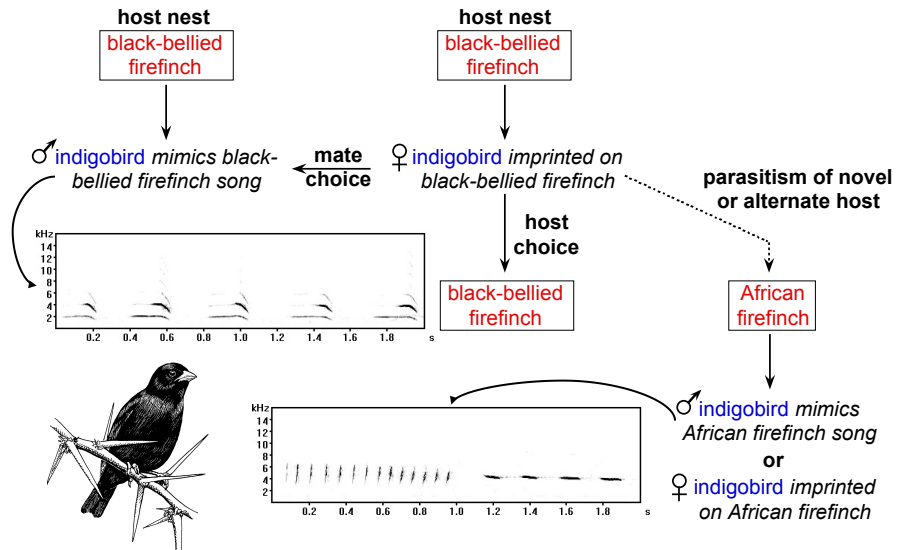


- ✧ ...learn and mimic host songs, resulting in assortative mating and providing a mechanism for rapid sympatric diversification by host shift





Balakrishnan & Sorenson 2007 Behav Ecol



*Tested in captive birds by Payne et al. 1998, 2000 Anim Behav
Figure from Edwards et al. 2005 PNAS

But...

- ❖ don't the same mechanisms promoting speciation also lead to hybridization?
- ❖ indigobirds from eggs laid in the nest of an “alternate” host will imprint on the “wrong” host and later hybridize with individuals of the indigobird species associated with that host

Association of mimicry song and morphology in 494 male indigobirds*

mimicry song	N male indigobirds <i>Vidua</i>			
	<i>cha.</i>	<i>fun.</i>	<i>pur.</i>	<i>cod.</i>
<i>L. senegala</i>	306	0	0	0
<i>L. rubricata</i>	1	63	0	1
<i>L. rhodopareia</i>	2	0	84	0
<i>H. niveoguttatus</i>	0	0	0	37

total mismatches $4/494 = 0.8\%$

*localities in S-C Africa with two or more *Vidua* species

Payne et al. 1992 Proc. PAOC

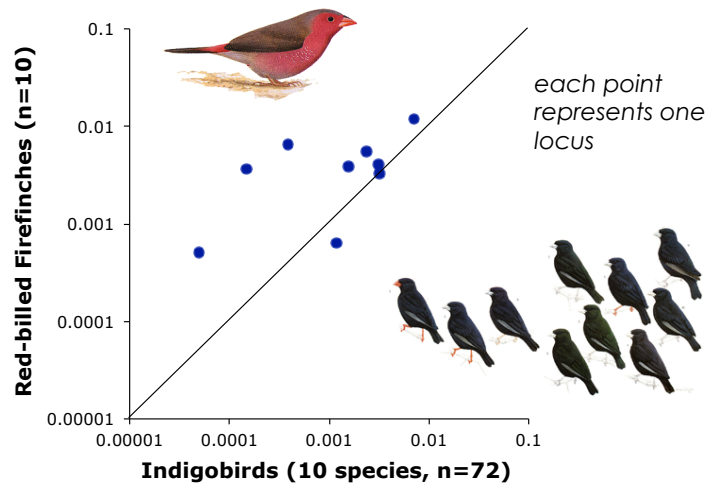
The question:
How “good” are indigobird species?

- ❖ Are indigobirds early in the process of evolving into fully distinct and reproductively isolated species?
- ❖ Or, are they stuck in a perpetual state of incomplete speciation due to imperfect isolating mechanisms?



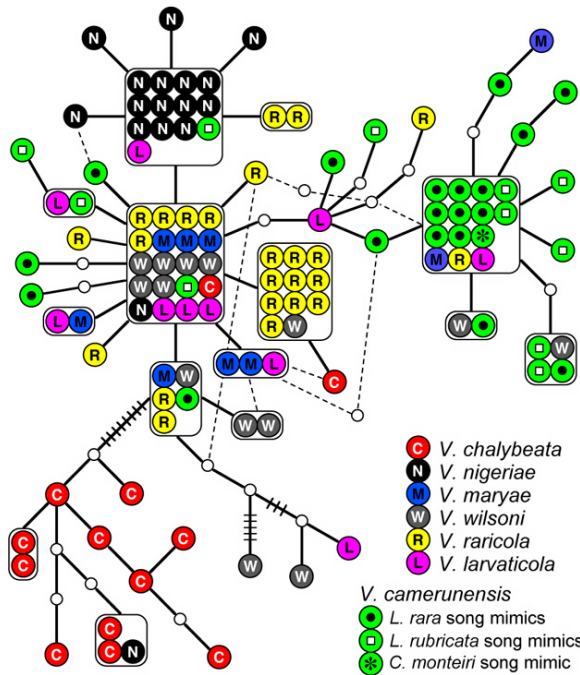
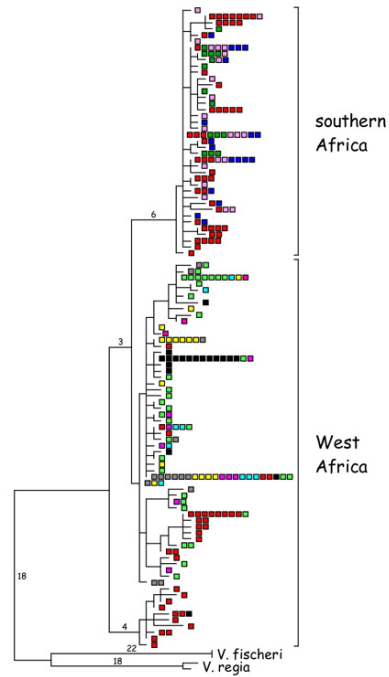
Field Identification of Indigobirds: Pilleri, Bull ABC Vol 3 No 1 - 25

Higher nucleotide diversity in one species of firefinch than in all 10 species of indigobirds **combined**



Phylogeny of indigobird mtDNA haplotypes

- *V. codringtoni*
- *V. purpurascens*
- *V. funerea*
- *V. chalybeata*
- *V. nigeriae*
- *V. maryae*
- *V. wilsoni*
- *V. raricola*
- *V. larvaticola*
- *V. camerunensis*

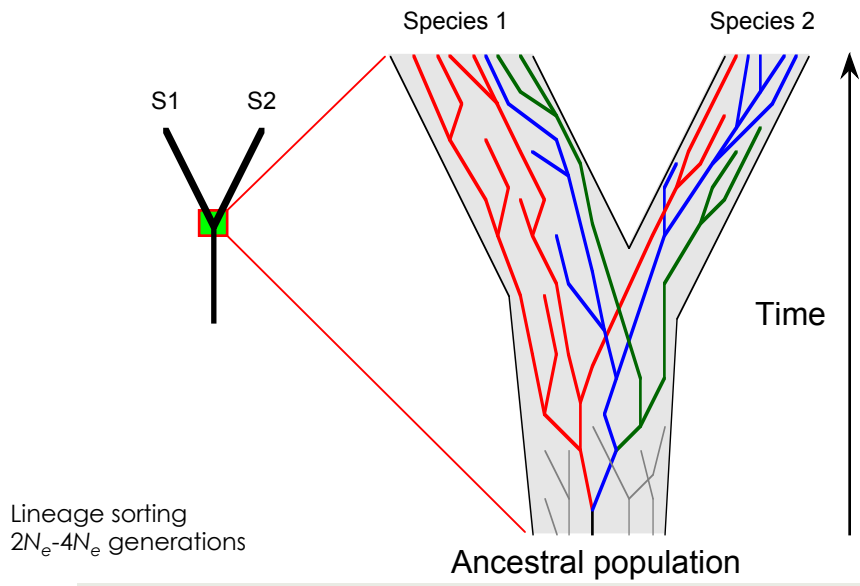


Network of West African haplotypes: Cameroon & Nigeria

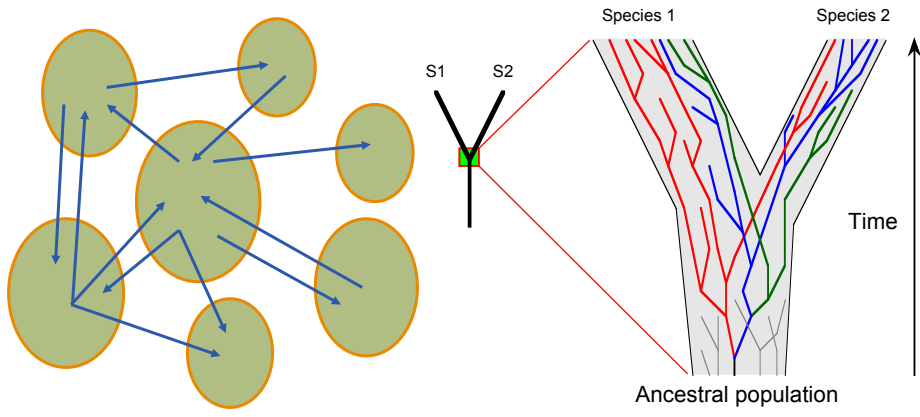
$\Phi_{ST} = 0.41$
 $p < 0.00001$

Sorenson et al. 2003 Nature

Ancestral polymorphism

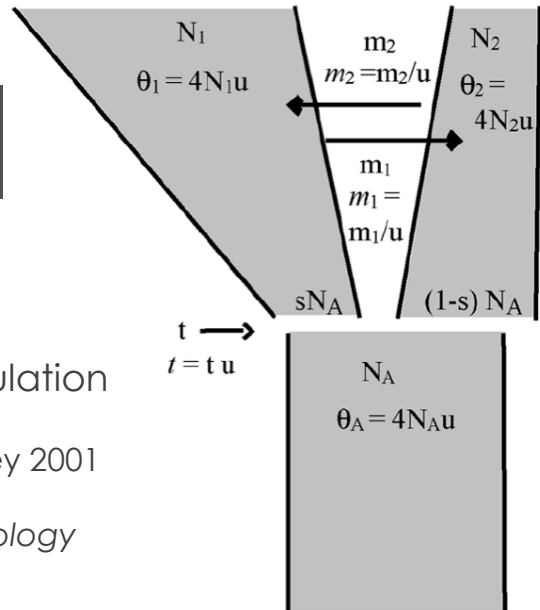


Indigobirds: gene flow plus lineage sorting



How to separate historical effects from current dynamics??

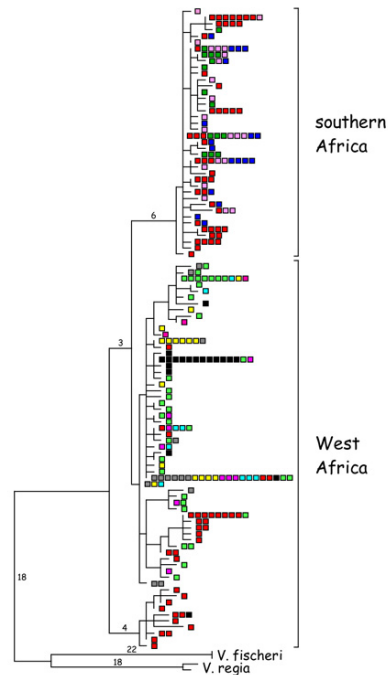
IM - Isolation with Migration

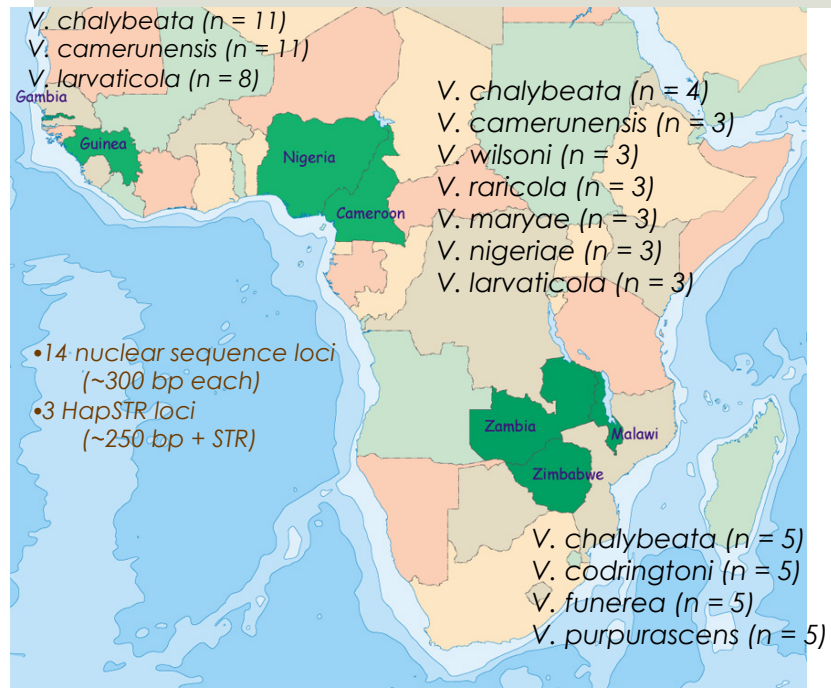


- ❖ model of population divergence
- ❖ Nielsen & Wakeley 2001 *Genetics*
- ❖ Hey 2005 *PLoS Biology*

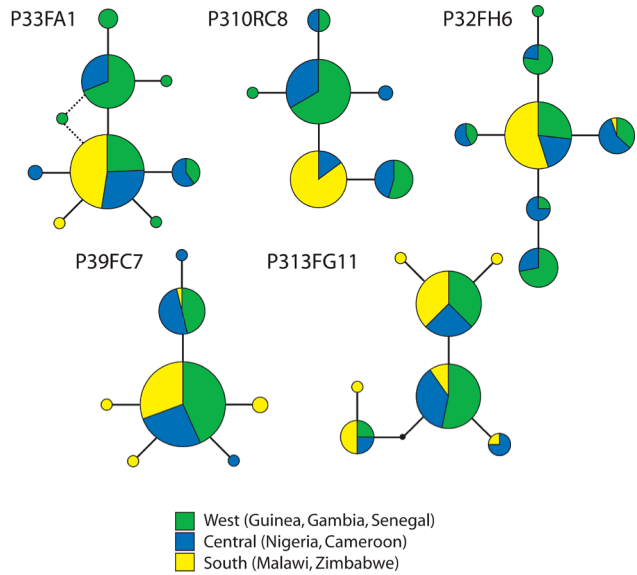
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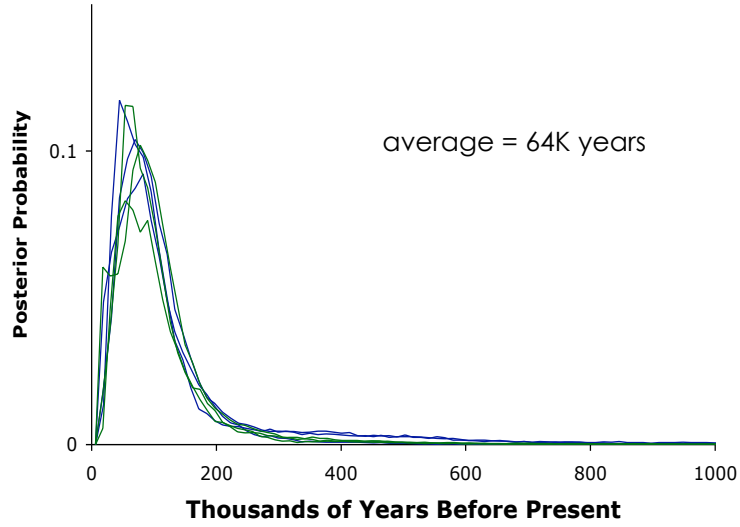




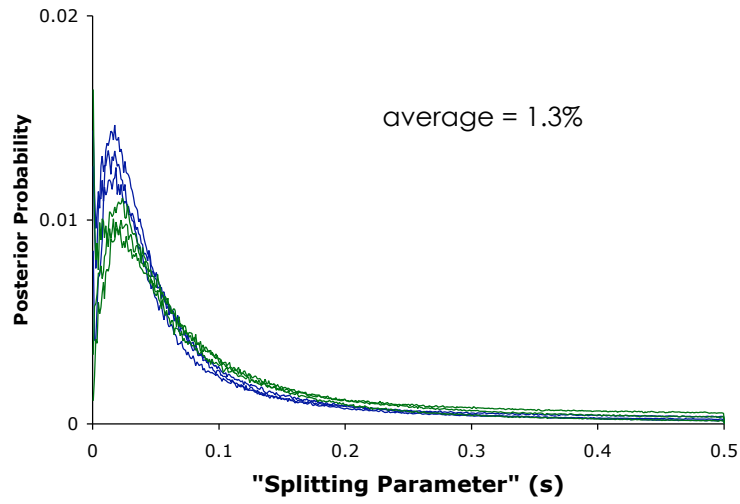
haplotype diversity at 5 nuclear loci in 10 species



IM analyses using 9 nuclear sequence loci



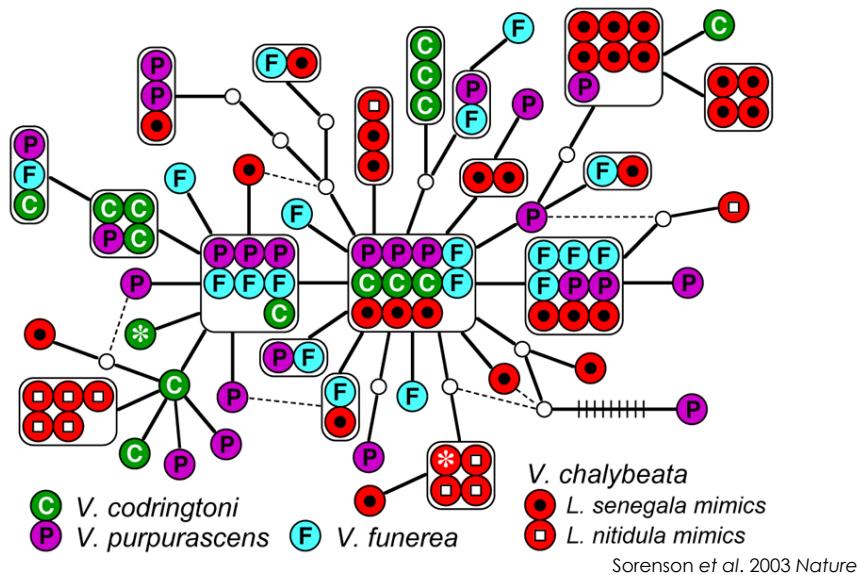
IM analyses using 9 nuclear sequence loci



Conclusions 1

- ❖ Indigobirds colonized southern Africa ~105 years ago and subsequently evolved into four distinct species!
- ❖ Coalescent analyses indicate a small founding population for southern Africa followed by substantial expansion

Network of indigobird mtDNA haplotypes:
Malawi, Zambia, and Zimbabwe



Conclusions 2

- ❖ Relatively greater genetic differentiation among indigobird species in the ancestral region of West Africa suggests that indigobird species may be slowly diverging from each other and evolving into truly independent evolutionary lineages

