



# Using “Digital Specimens” to explore the behavioral phenotype

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The **Cornell** Lab  of Ornithology

# Biological Specimens



Magnificent Riflebird  
Specimens at the Netherlands  
Centre for Biodiversity Naturalis

Bird Collection at NMNH  
(Smithsonian Inst)

# Biological Specimens



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ML Video #455444, Magnificent Riflebird, Indonesia, 2009

# Biological Specimens



Magnificent Riflebird  
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Videos by Benjamin Clock for Macaulay Library

# Biological Specimens



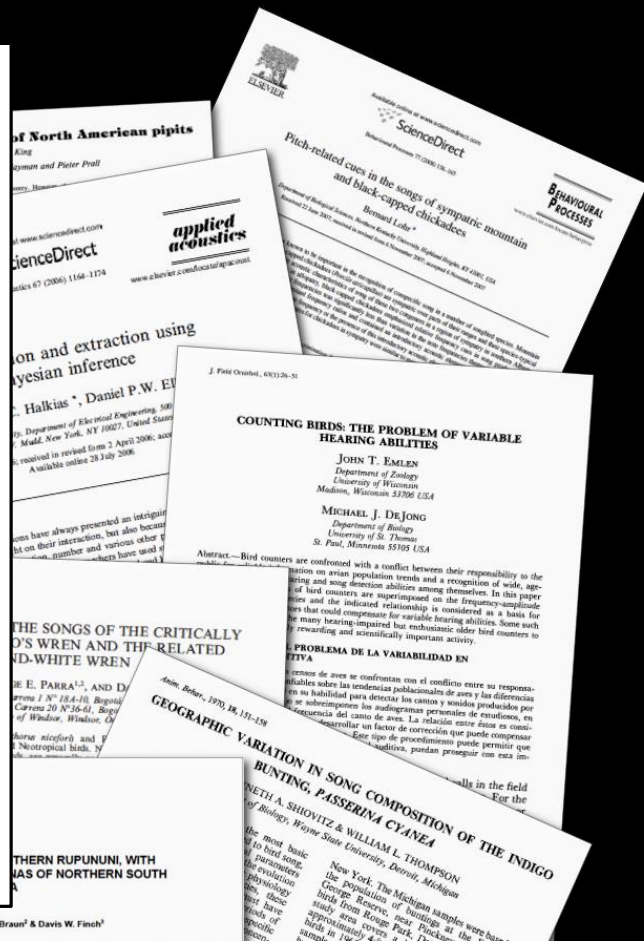
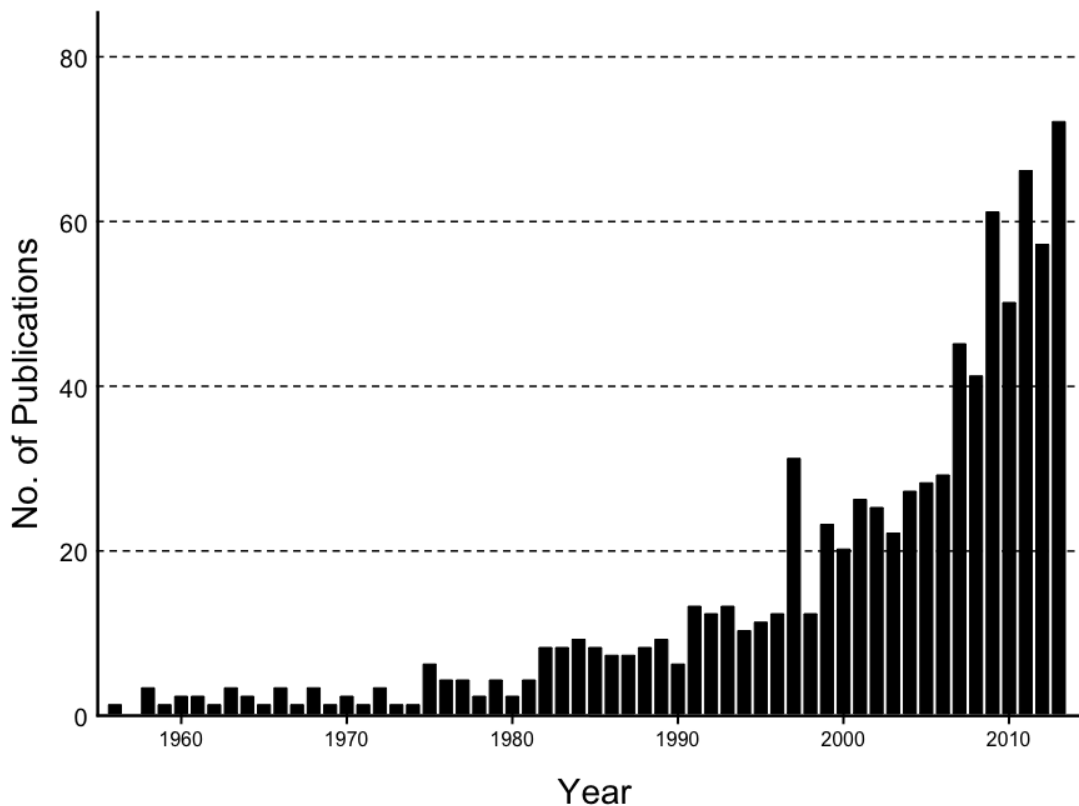
Musician Wren  
(*Cyphorhinus arada*)  
ML Audio #29734  
Recorded by Ted Parker  
August 1982  
Madre de Dios, Peru

The Macaulay audio/video collection has over 250,000 digital specimens

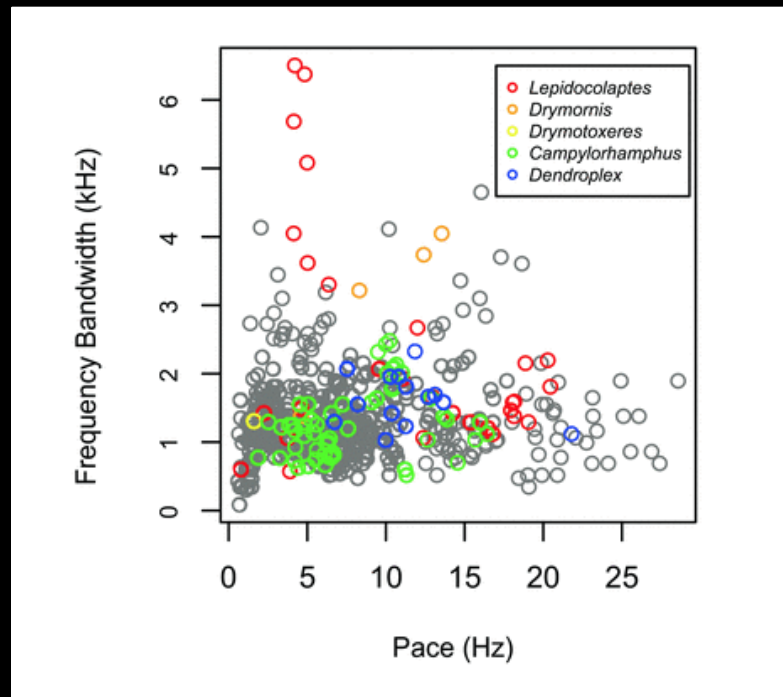
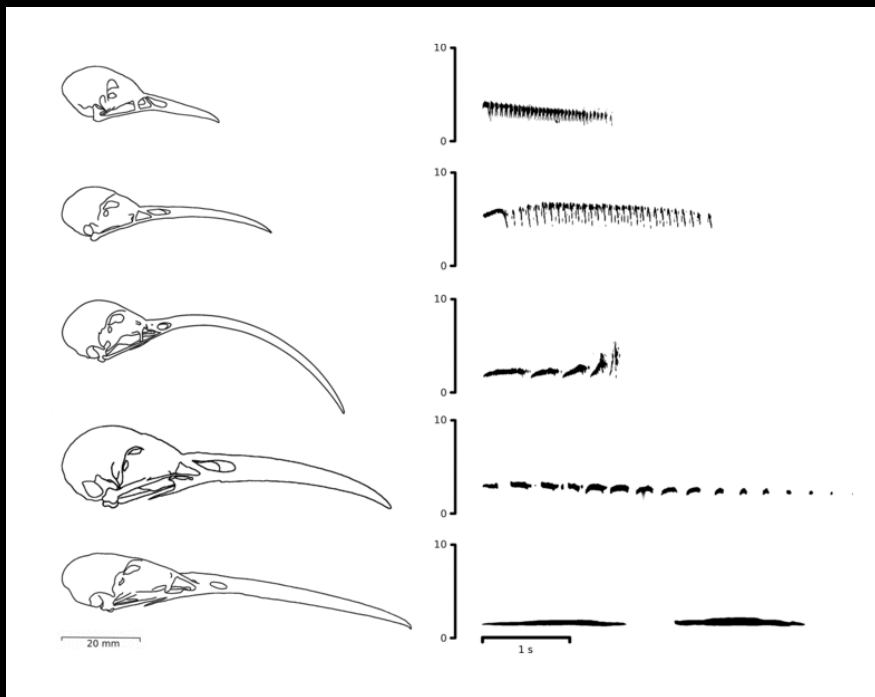


Photo: Conservation International, Haroldo Castro

# Macaulay Library Publications

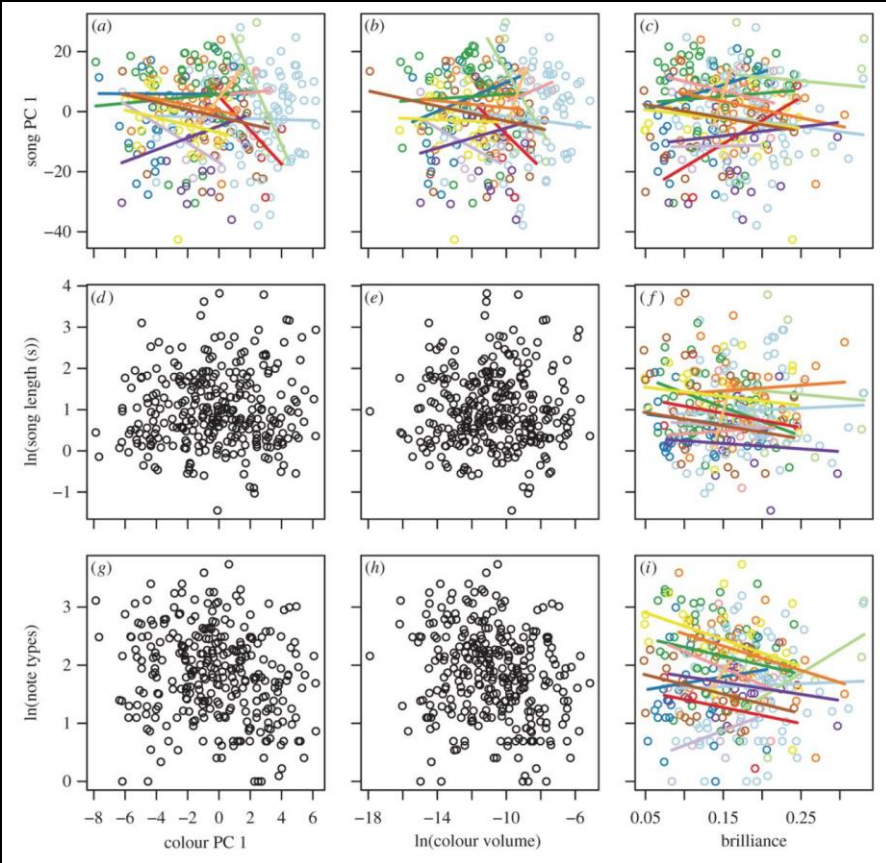


# Woodcreepers (Dendrocolaptinae)



Derryberry et al. (2012) Correlated evolution of beak morphology and song in the neotropical woodcreeper radiation. *Evolution* 66: 2784-2797.

# Evolution of Multiple Signals

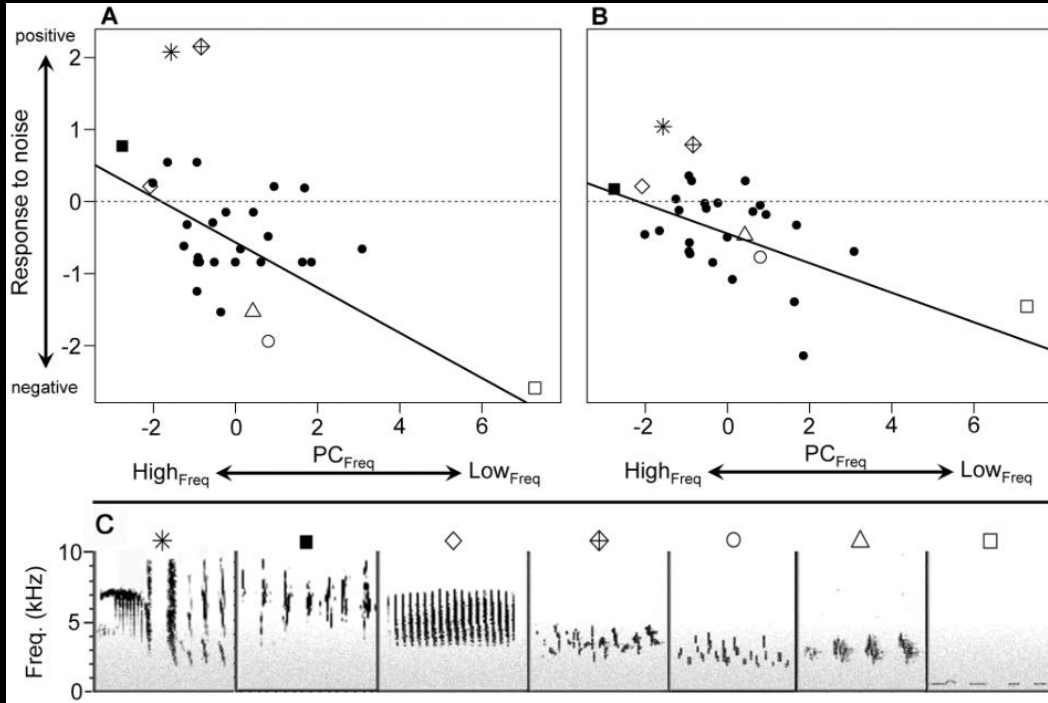


Mason et al. (2014) Elaborate visual and acoustic signals evolved independently in a large, phenotypically diverse radiation of songbirds. *Proc Royal Soc B* 281: 21040967.





# Effects of Noise on Bird Communities

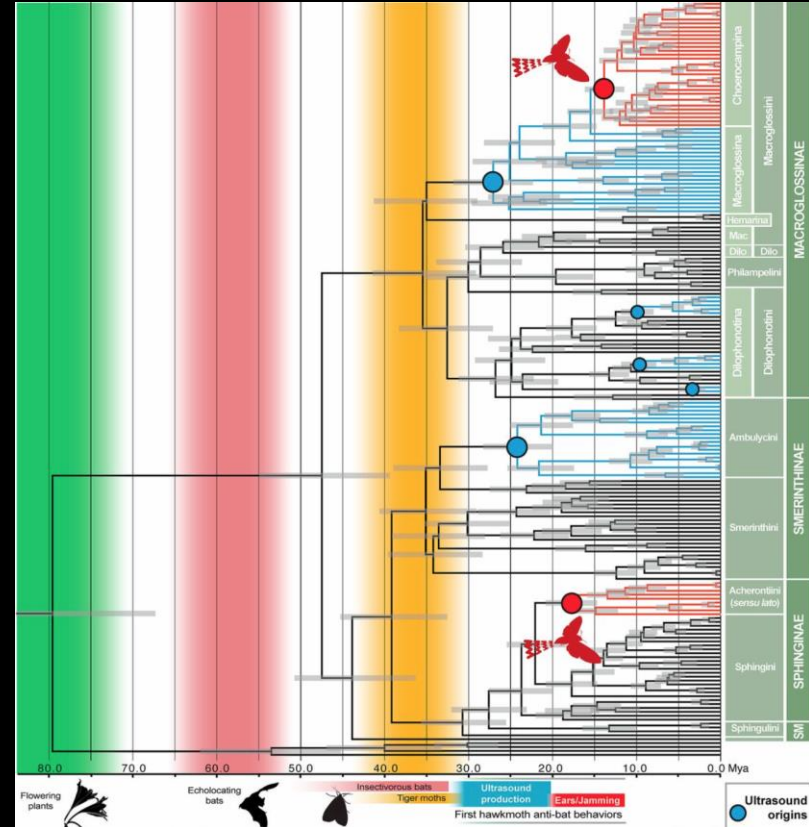


Francis, C. D., C. P. Ortega, and A. Cruz (2011). Noise pollution filters bird communities based on vocal frequency. PLoS ONE 6.

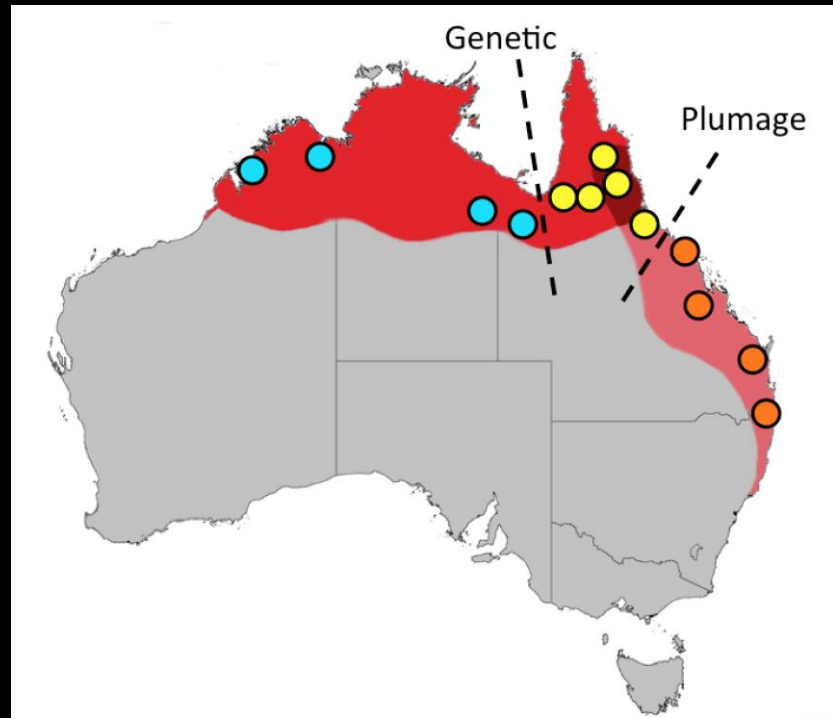
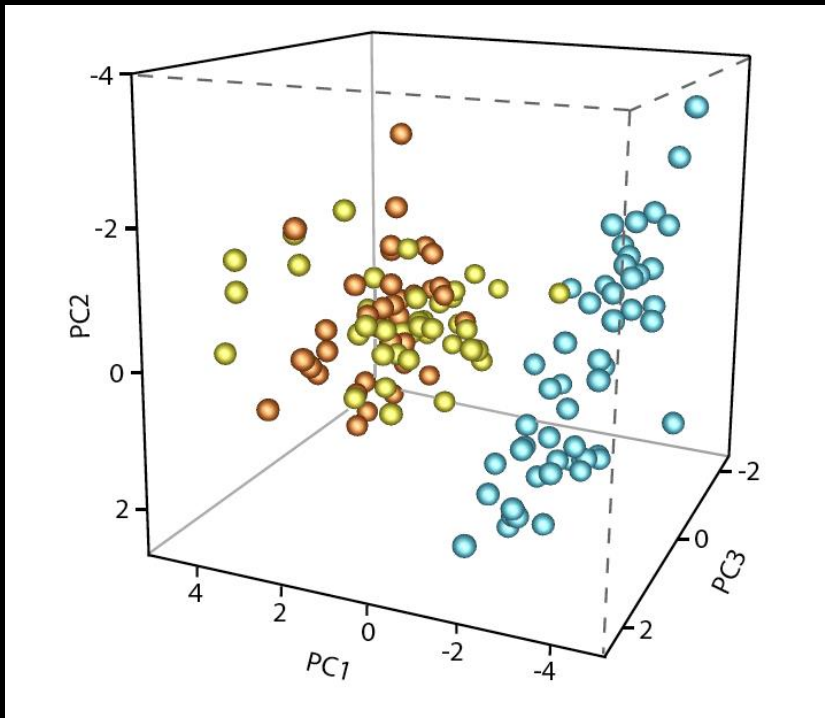
# Evolution of Hawkmoth Defenses



Kawahara & Barber (2015) Tempo and mode of anti-bat ultrasound production and sonar jamming in the diverse hawkmoth radiation. *PNAS* 112: 6407-6412.



# Evolution of Multiple Signals



Greig & Webster (2013) Spatial decoupling of song and plumage generates novel phenotypes between two avian subspecies. *Behavioral Ecology* 24: 1004-1013

# Seeing Sound

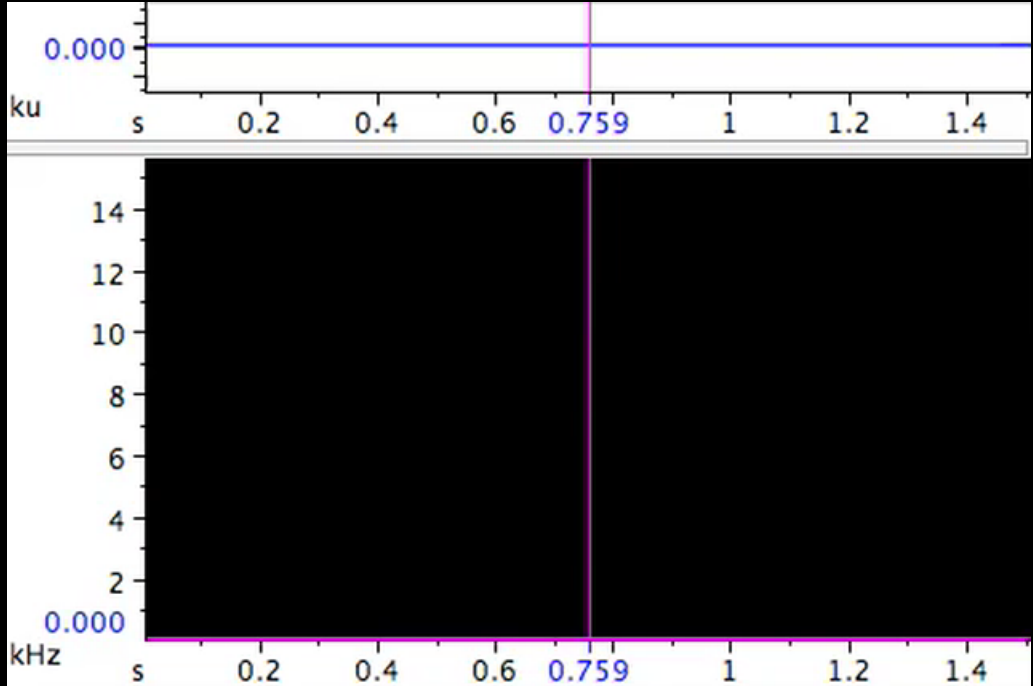


Crested Oropendola  
(*Psarocolius decumanus*)

# Seeing Sound



Crested Oropendola  
(*Psarocolius decumanus*)

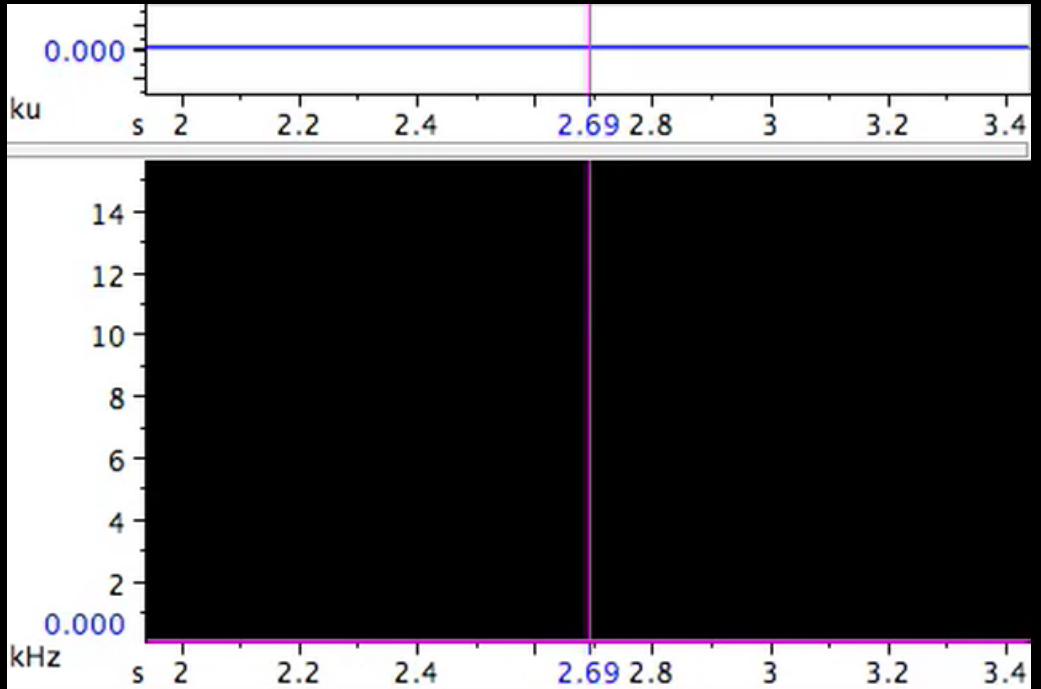


ML Audio #12830

# Seeing Sound



Crested Oropendola  
(*Psarocolius decumanus*)



ML Audio #12830 (one-quarter speed)

# Birds of Paradise Study



Rusty Ligon



Ed Scholes



Wahnes's Parotia, Macaulay Library #469253

Also with Tim Laman, Todd Harvey

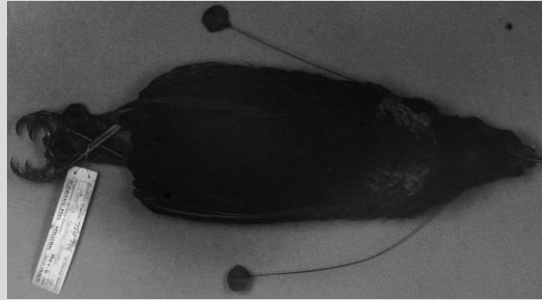


# Quantifying Coloration



Ultraviolet

Visible



Modelled avian visual system



# Quantifying Displays

now 



# Quantifying Displays



# Birds of Paradise



Research with Todd Harvey, Rusty Ligon



Painting by John Gould

# Birds of Paradise

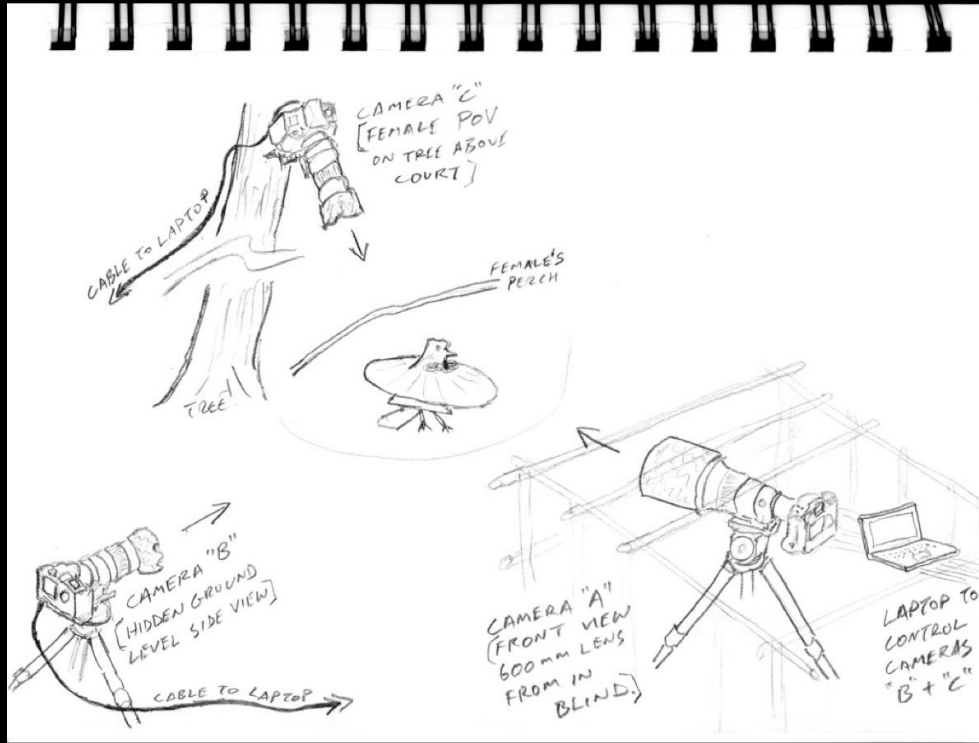


Wahnes's Parotia, Macaulay Library #469253



Painting by John Gould

# Birds of Paradise

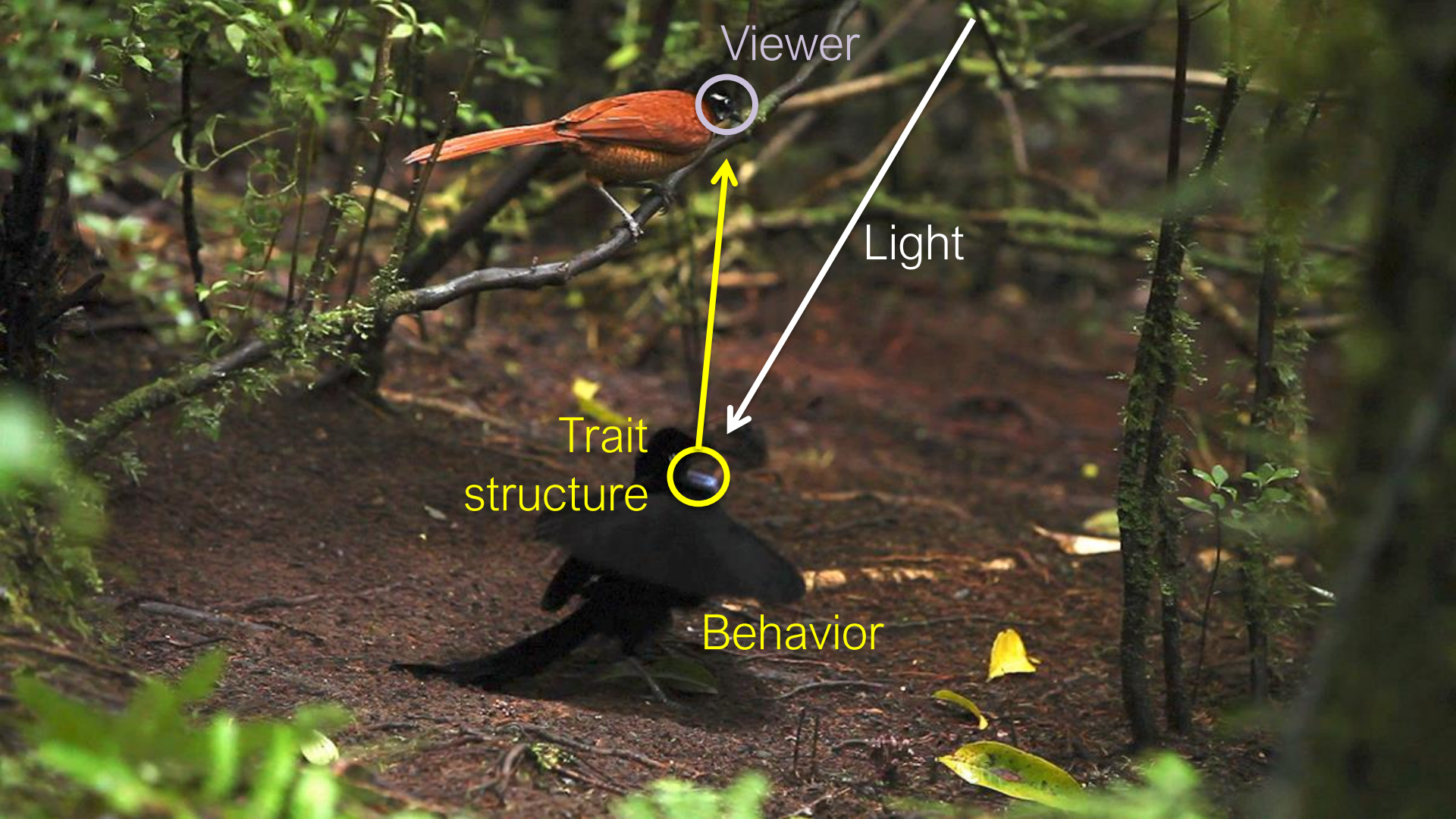


Painting by John Gould

# Dissecting a display

Side view

Female view



Viewer

Light

Trait  
structure

Behavior





Film courtesy of Ed Scholes & Todd Harvey

SIDE\_CAMERA

Thanks!

The **Cornell** Lab  of Ornithology

# Going Global



# Going Global



Ecuador camera trap videos courtesy of Luke Brown

# More manakin displays



Black Manakin  
(*Xenopipo atronitens*)



Film by Justin Houck, Lainy Day, and Willow Lindsay

# More manakin displays



Black Manakin  
(*Xenopipo atronitens*)

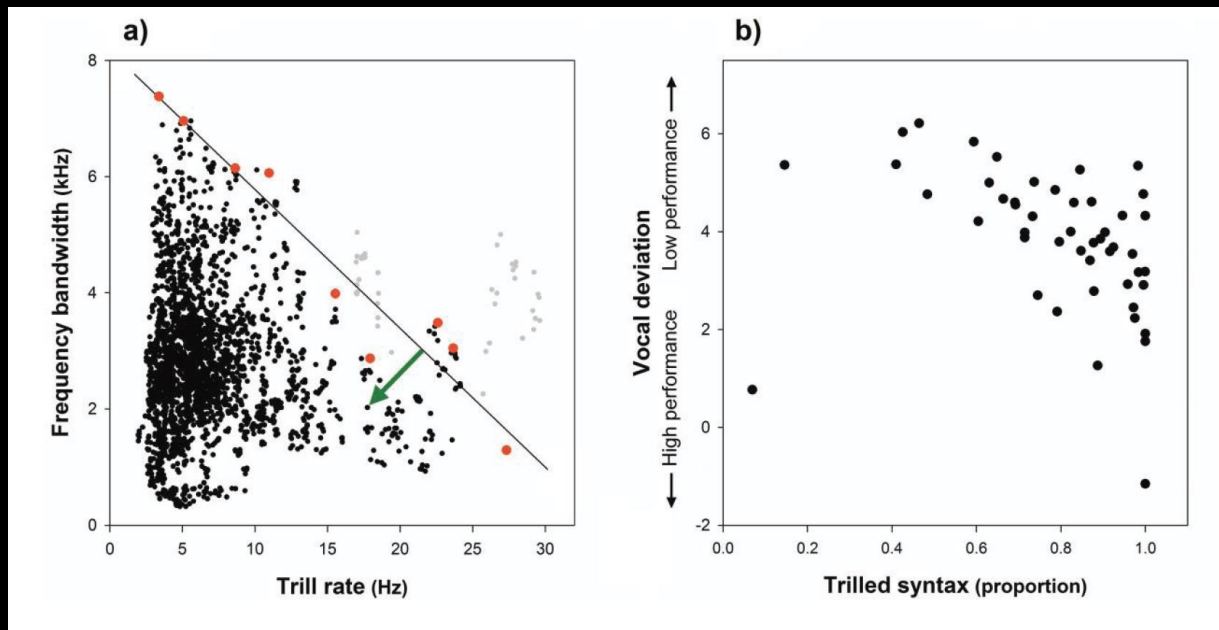


Film by Justin Houck, Lainy Day, and Willow Lindsay

# North American Wood Warblers

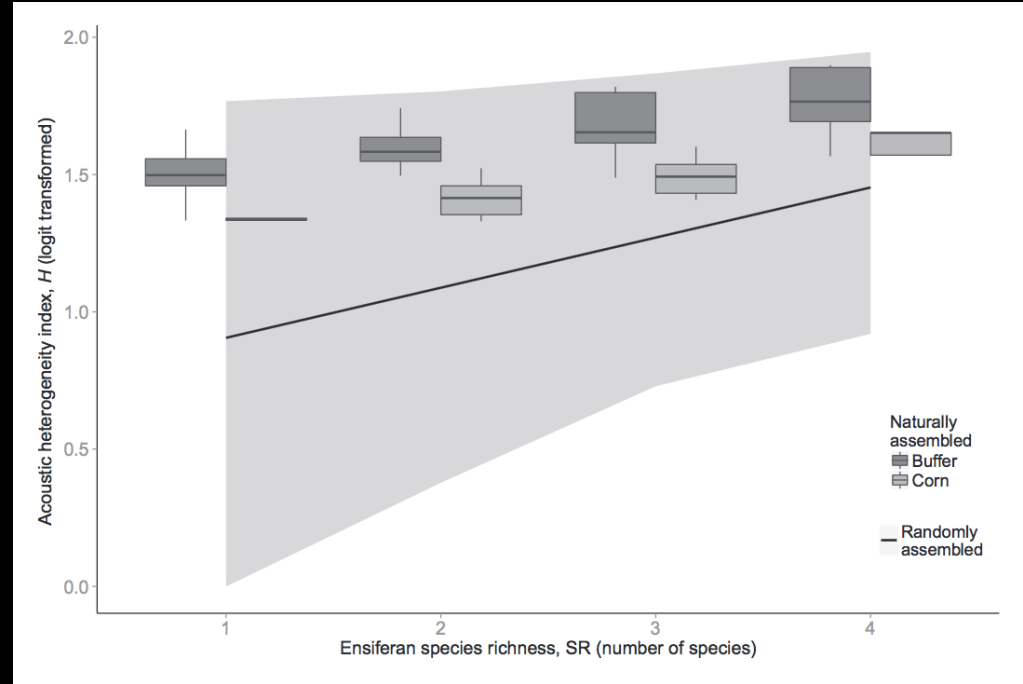


Photo: Nick Shearman



Cardoso, G. C., and Y. Hu (2011). Birdsong performance and the evolution of simple (rather than elaborate) sexual signals. *American Naturalist* 178:679-686.

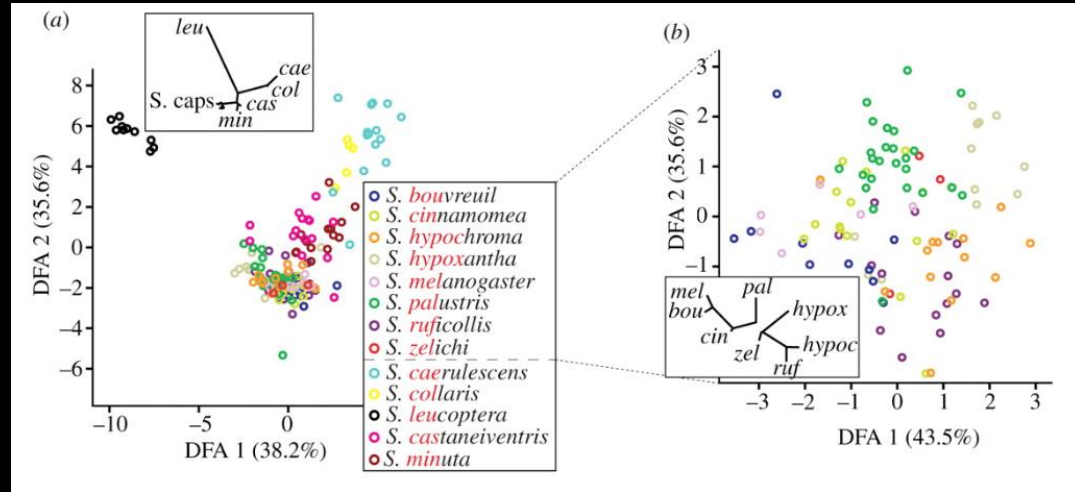
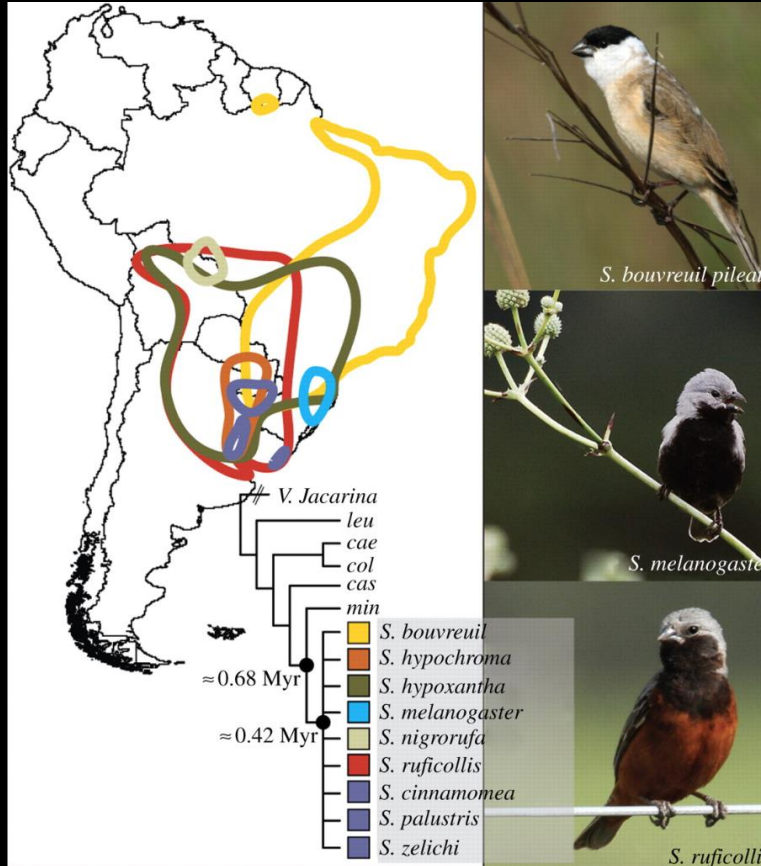
# Assembly of Ecological Communities



Torrecilla & Roca (2015) Acoustic assessment of species richness and assembly rules in ensiferan communities from 3 temperate ecosystems. *Ecology* 97:116-123.



# Capuchino Seedeaters (*Sporophila* spp.)



## Song Similarity

Campagna et al. (2012). Rapid phenotypic evolution during incipient speciation in a continental avian radiation. *Proc. Roy. Soc. B* 279: 1847-1856.