

Sexual Selection

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Hypotheses for sexual selection



Sexual selection: Differential success in mating or fertilization as a result of preferences in one sex for traits in the other sex

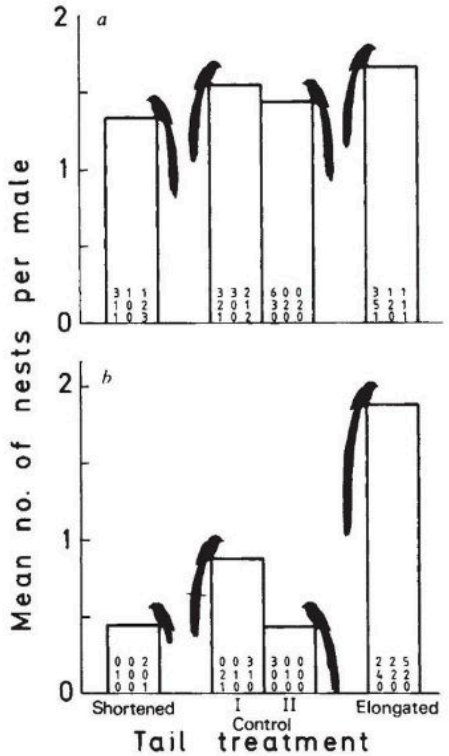
1) **Good genes hypothesis**: Plumage & courtship give honest signals of genetic quality
2) **Direct benefits hypothesis**: Ornaments communicate ability to provide resources &/or protection
3) **Arbitrary choice hypothesis**: If females prefer a trait, they might select males with the trait to increase chances of sons with the trait

(*Astrapia splendidissima*)

Experimental evidence for mate choice: tail length

- *E. progne* are **polygynous**: each male has multiple female mates)
- Female widowbirds prefer elongated tails (a type of **ornament**, i.e. a physical trait used to attract mates)



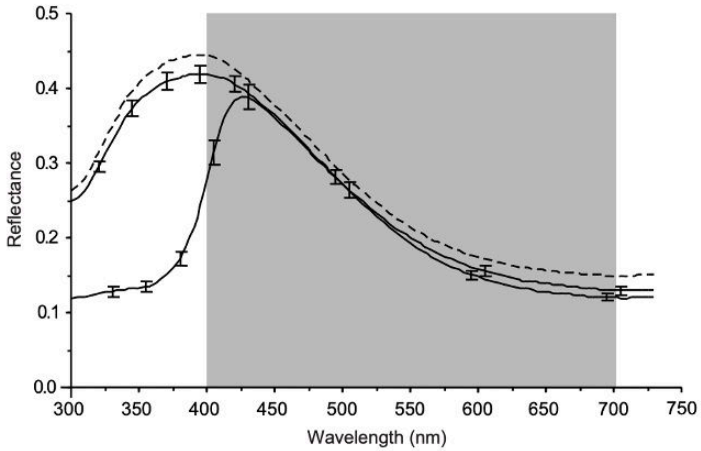


https://www.youtube.com/watch?v=OPI-9oi19gQ

(*Euplectes progne*; Andersson 1982)

Experimental evidence for mate choice: UV color

- Male Bluethroats (*Luscinia svecica*) were left untreated (top), rubbed with baby oil (middle), or rubbed with sunblock (bottom)
- Birds treated with sunblock had lower mating success



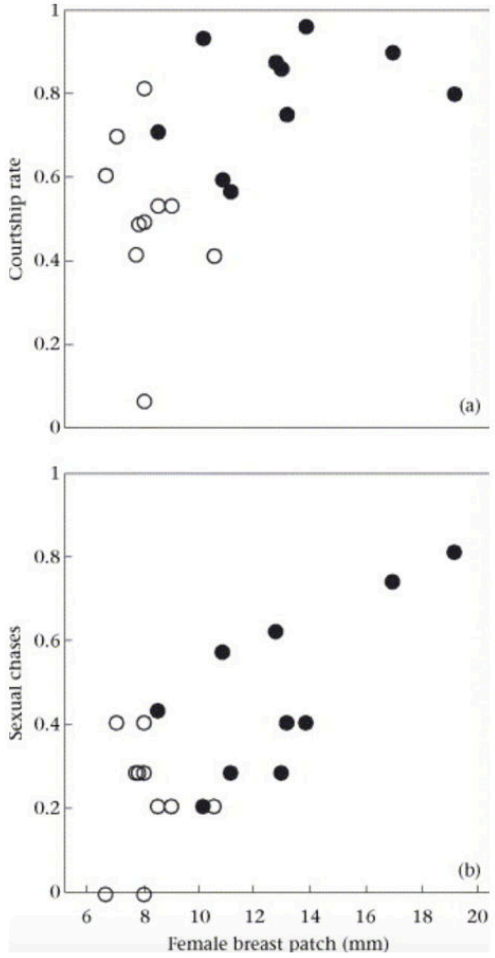


(ML182455611; Johnsen et al. 1998)

Male mate choice matters, too

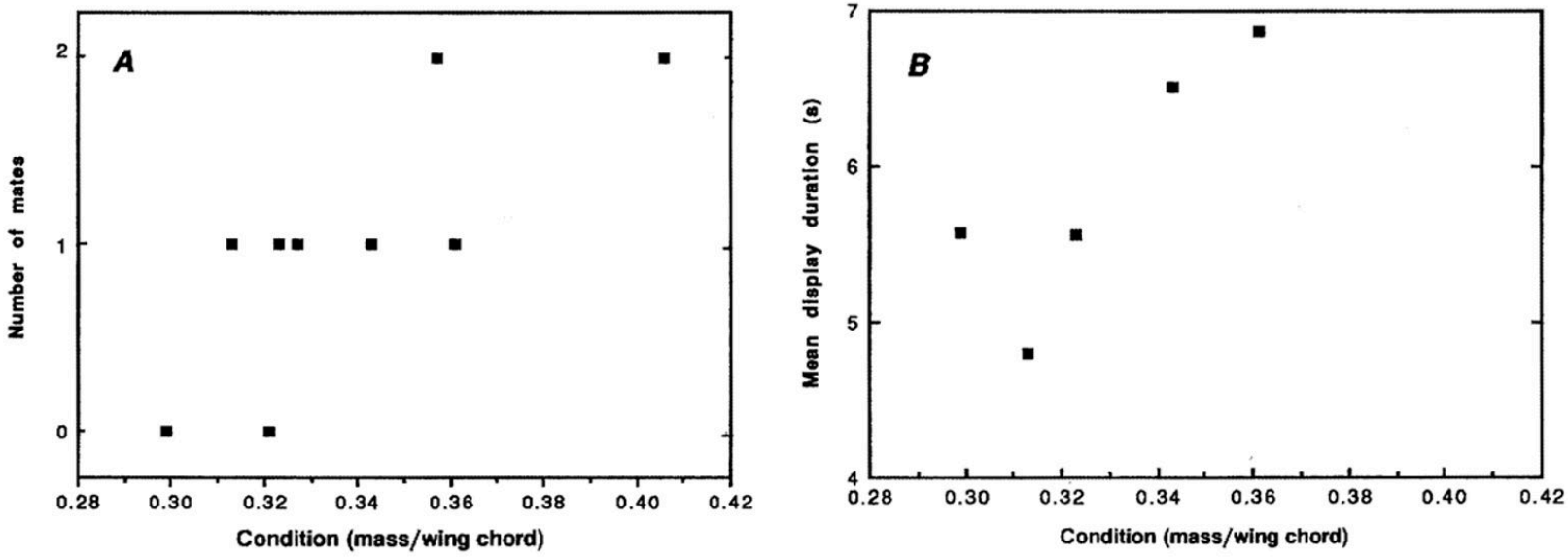
- Male Rock Sparrows (*Petronia petronia*) prefer females with larger breast patches





(ML43010621; Griggio et al. 2005)

What hypothesis is best supported in Bobolinks?



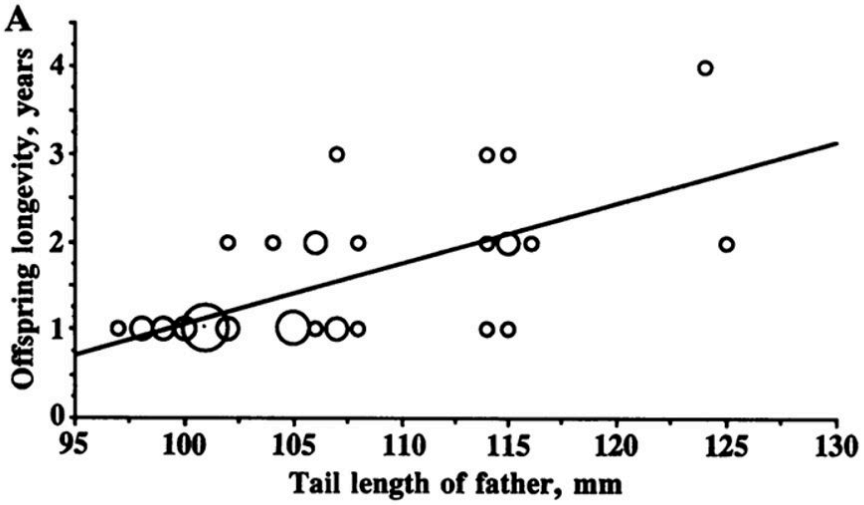
(Mather & Robertson 1992)

a) good genes
b) indirect benefits
c) arbitrary choice
d) none of the above

What hypothesis is best supported in Barn Swallows?

- Additional Info: Tail length negatively correlated with male provisioning; no association with provisioning across both sexes



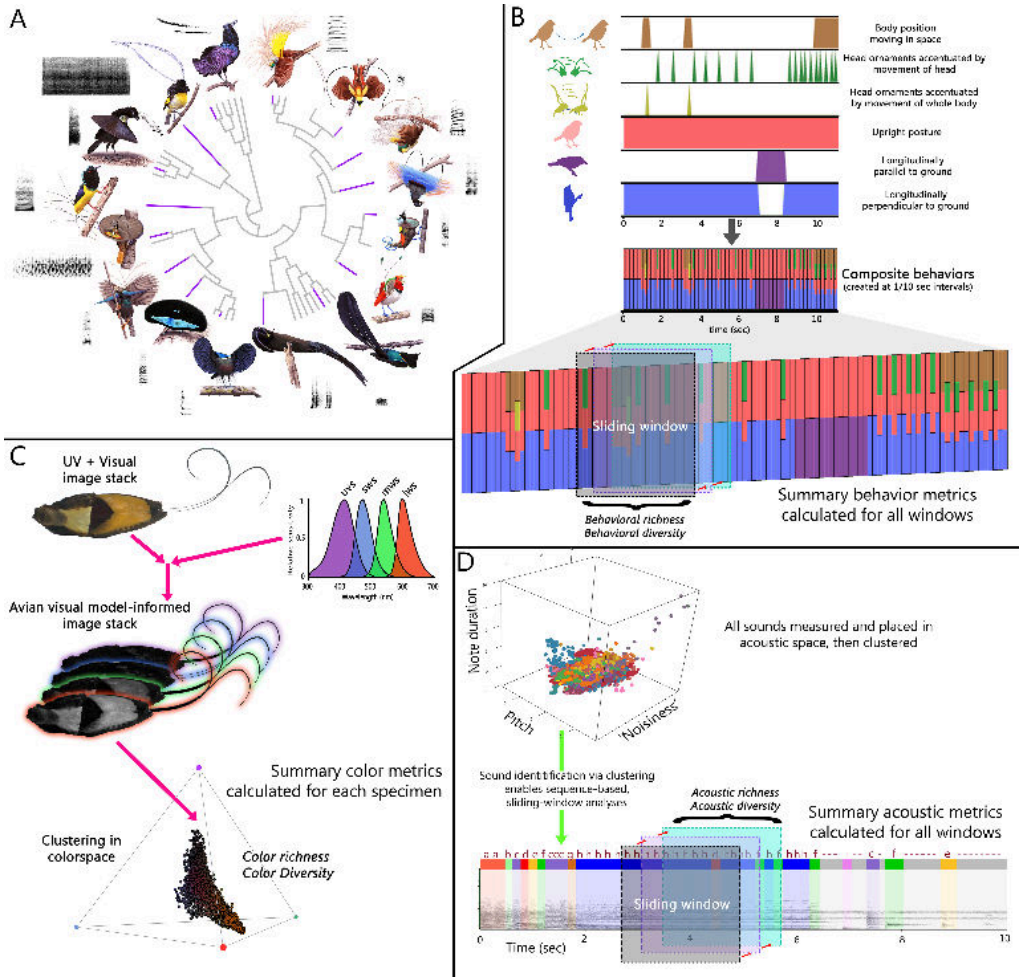


(*Hirundo rustica*)

a) good genes
b) indirect benefits
c) arbitrary choice
d) none of the above

Birds of Paradise

- Few tradeoffs between complexity of signals

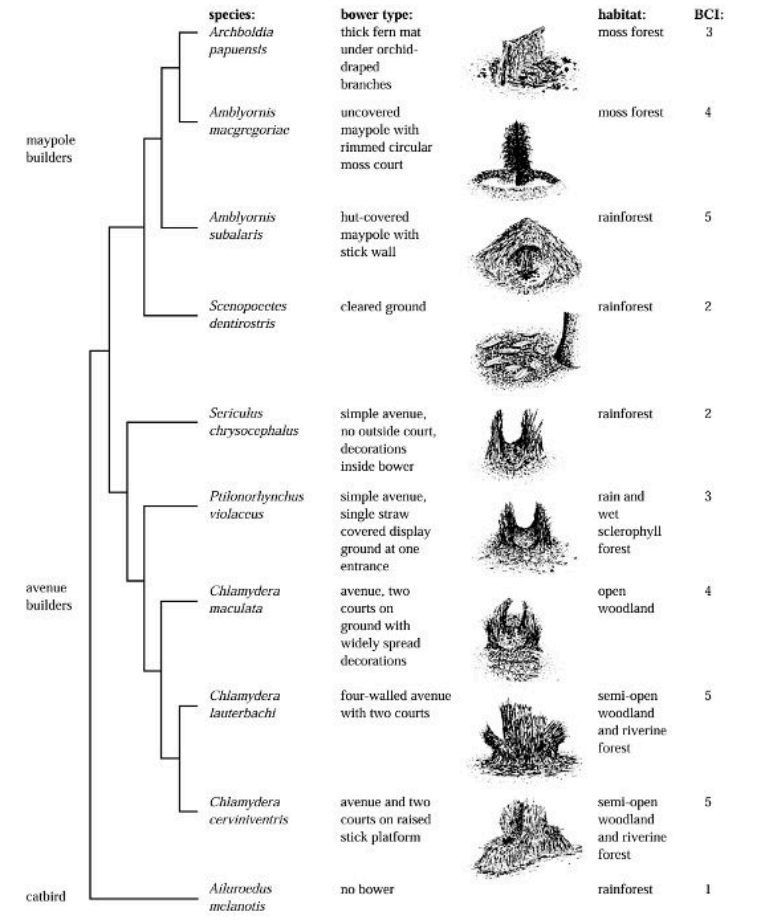


https://www.youtube.com/watch?v=nWfyw51DQfU

(Ligon et al. 2018)

Bowerbird bowers are constructed ornaments that reflect evolutionary history

- "extended phenotype" (like beaver dam)

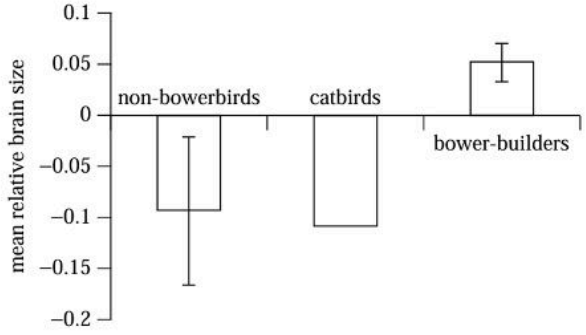


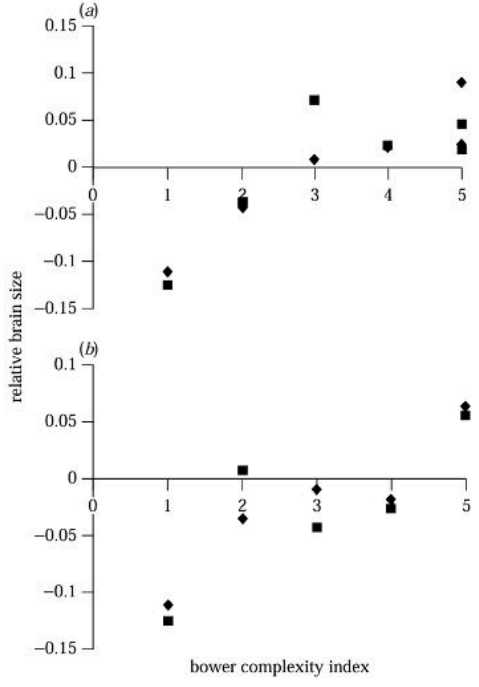
https://www.youtube.com/watch?v=1XkPeN3AWIE

(Madden 2001)

Does building bowers requires advanced cognitive abilities?

- Prediction: Bowerbirds have bigger brains than close relatives, and brain size increases with bower complexity within clade



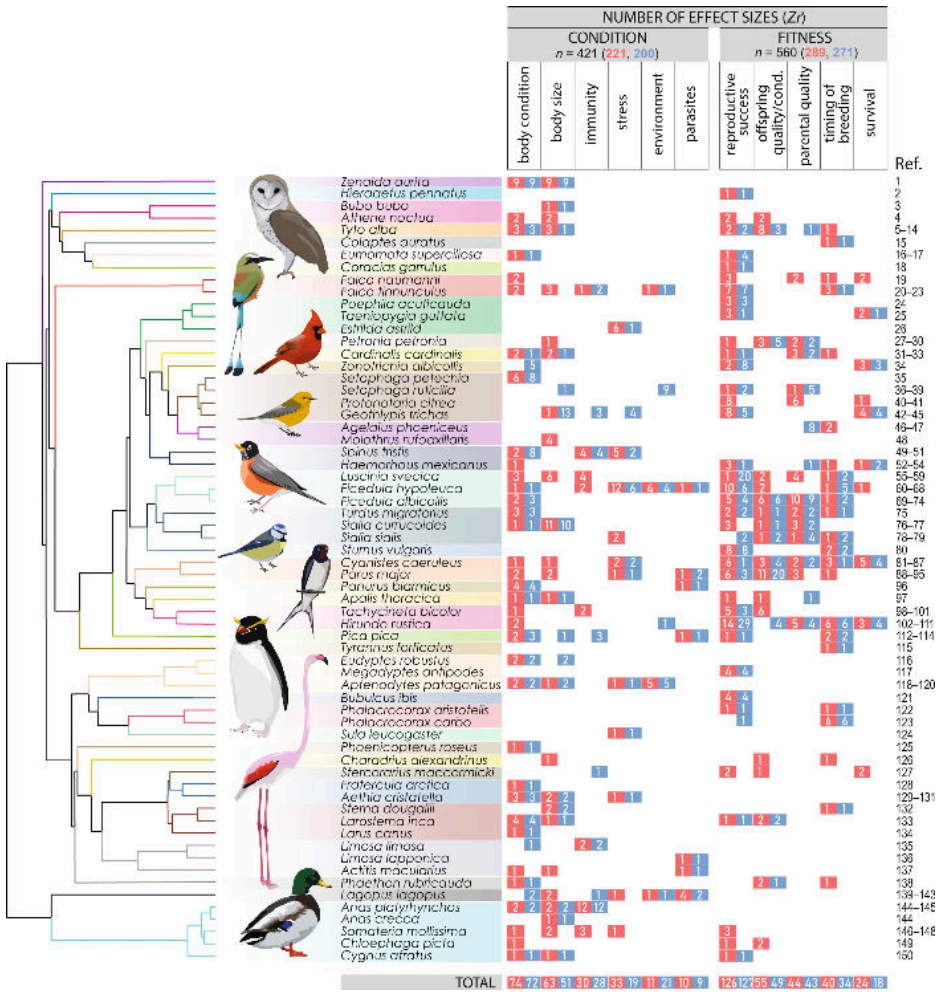


(Madden 2001)

a) yes
b) no
c) i'm falling back asleep

Both male and female ornaments are informative

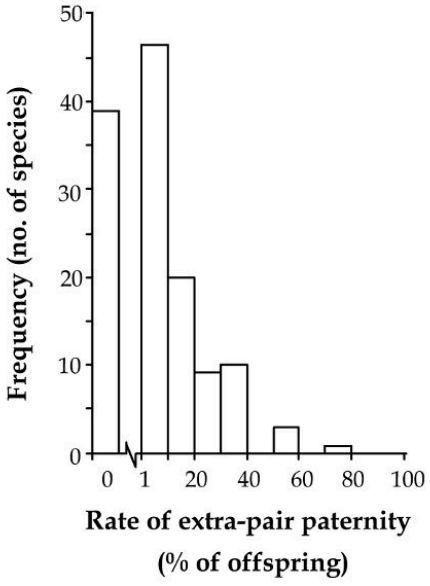
- Evidence for good genes and direct benefits hypotheses in both sexes

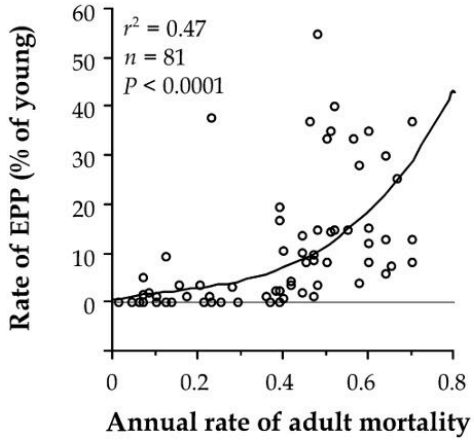


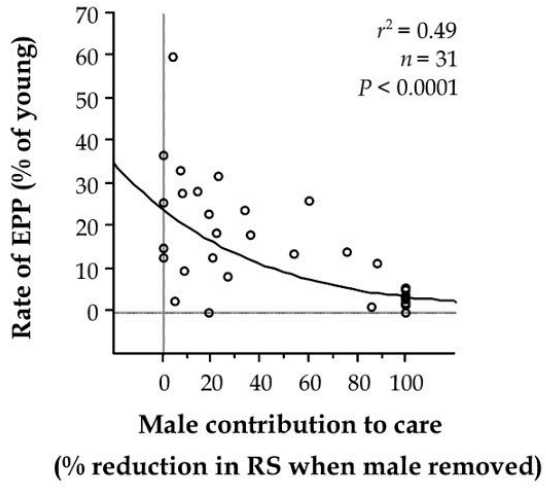
(Nolazco et al. 2022)

Extra-pair paternity is unexpectedly common

- Predictors: adult mortality (+); male contribution to care (-)



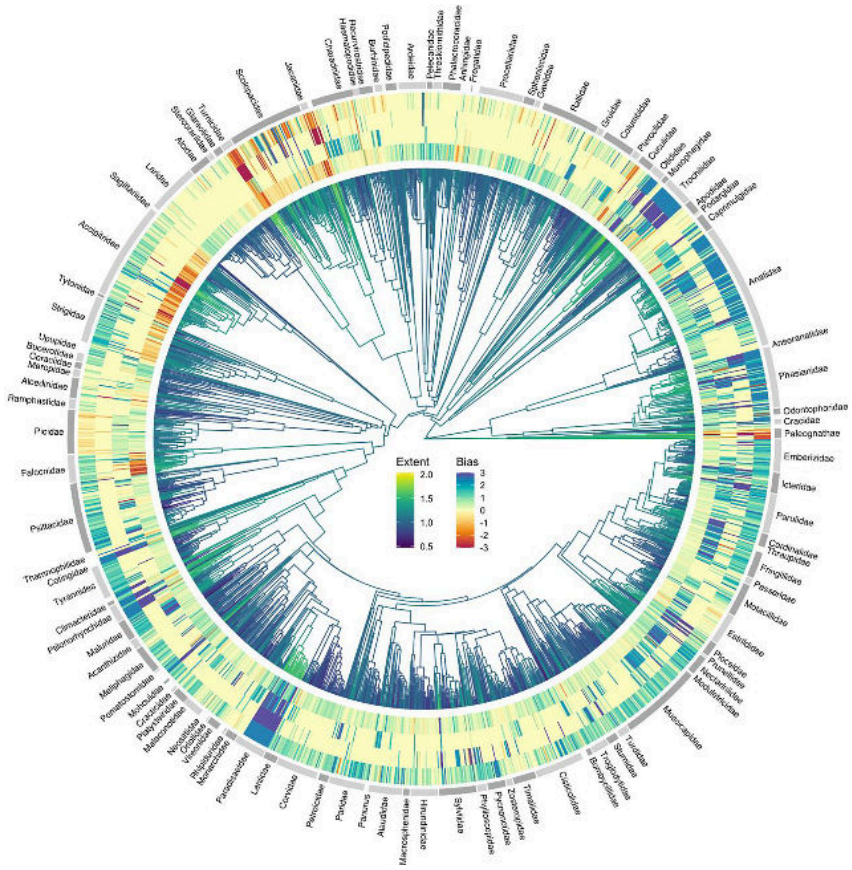




(Griffith et al. 2002)

Sexual selection leads to sexual dimorphism

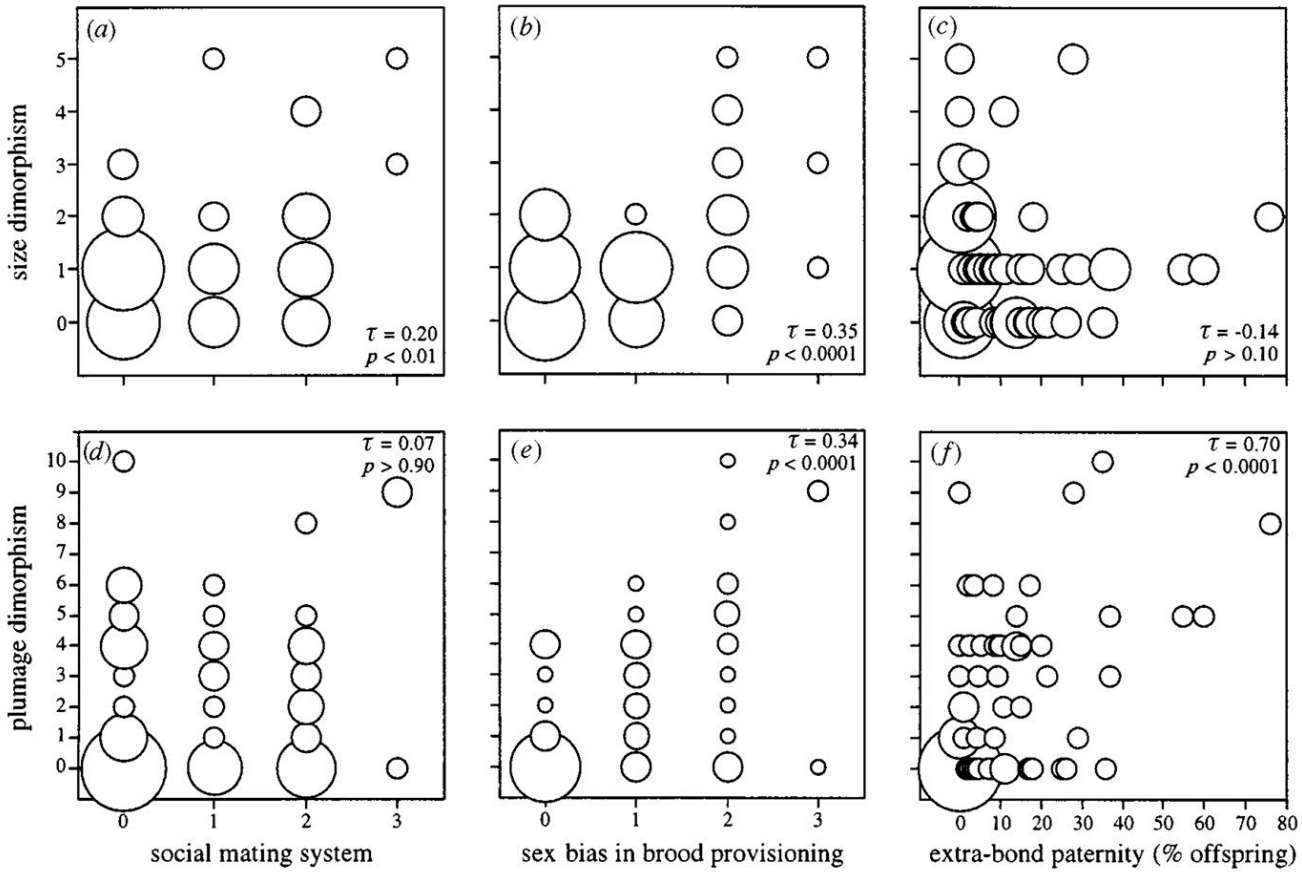
- Types of dimorphism: **sexual dichromatism** and **sexual size dimorphism**
- Has evolved repeatedly (outer two circles below)



(Gonzalez-Voyer et al. 2022)

Sexual dimorphism has different causes

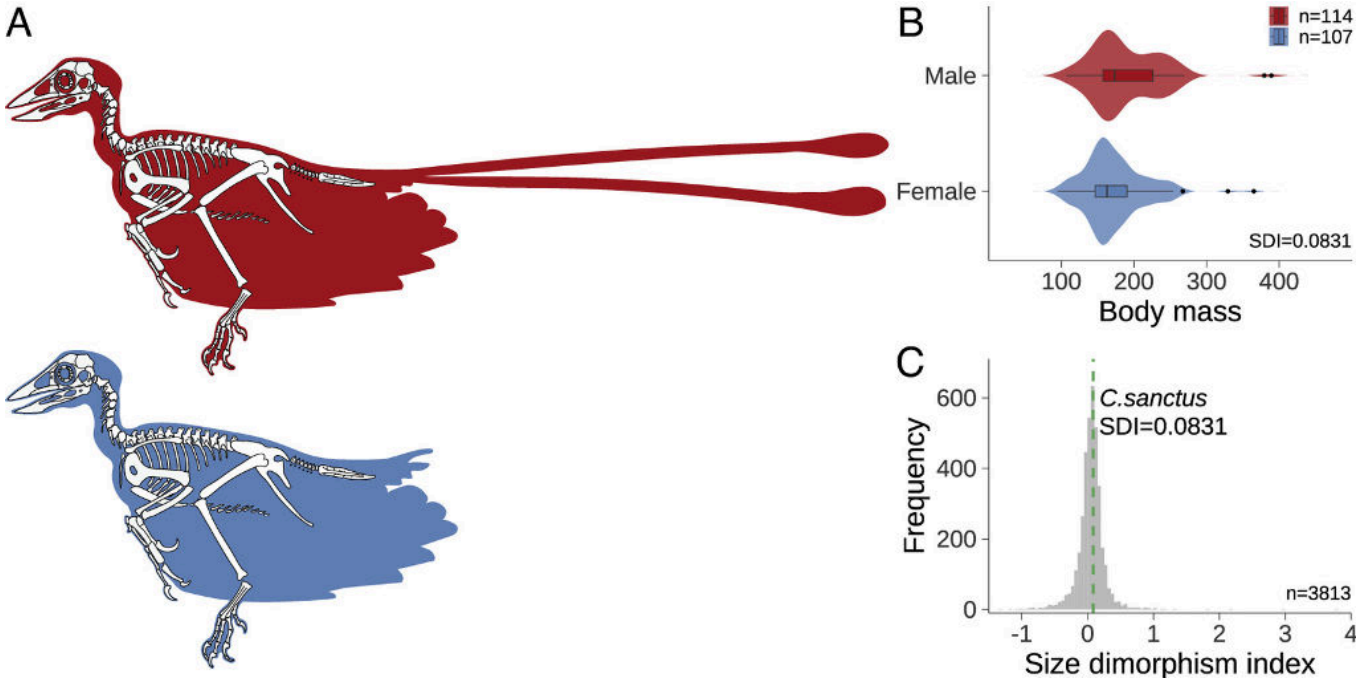
- Sexual size dimorphism predicted by mating system and parental care
- Sexual dichromatism predicted by parental care and extra-pair paternity



(Owens & Hartley 1998)

Sexual dimorphism is present in fossil birds

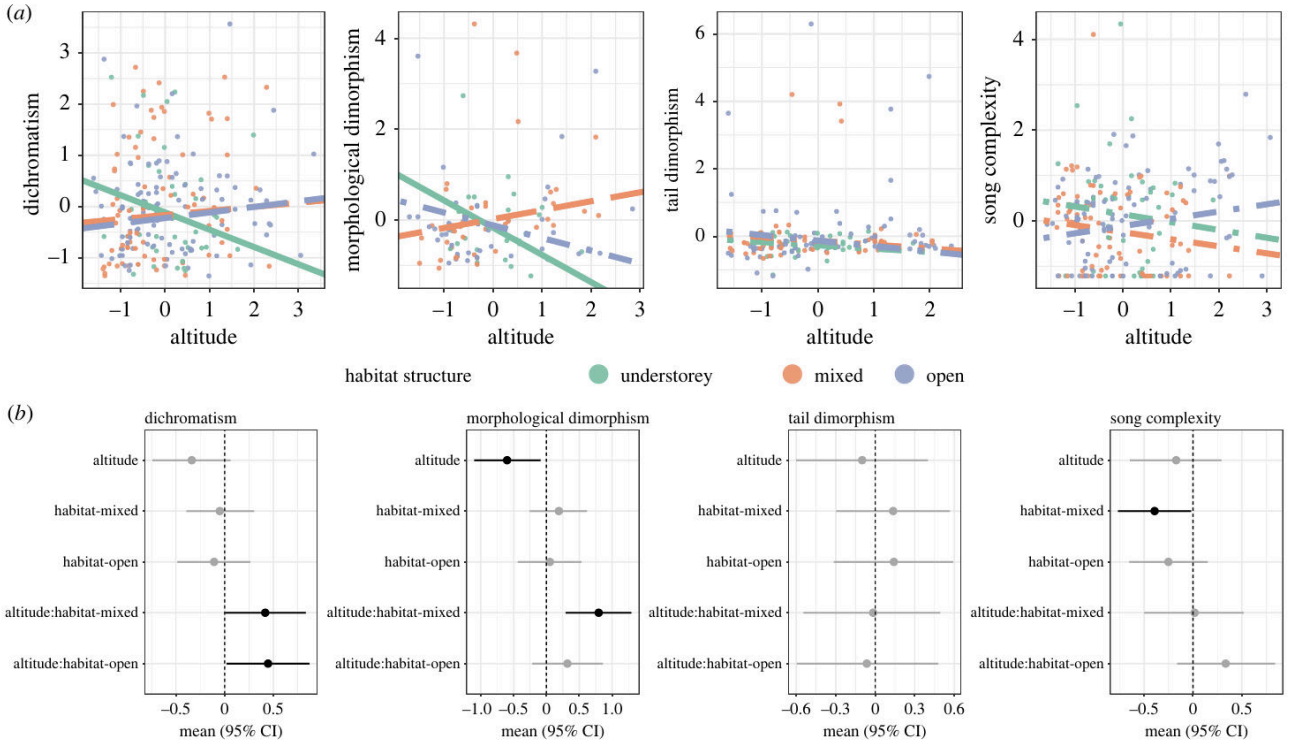
- *Confuciusornis sanctus* fossils indicate paired, elongated retrices were a male sexual ornament



(Zhou et al. 2024)

Natrual selection can constrain dimorphism

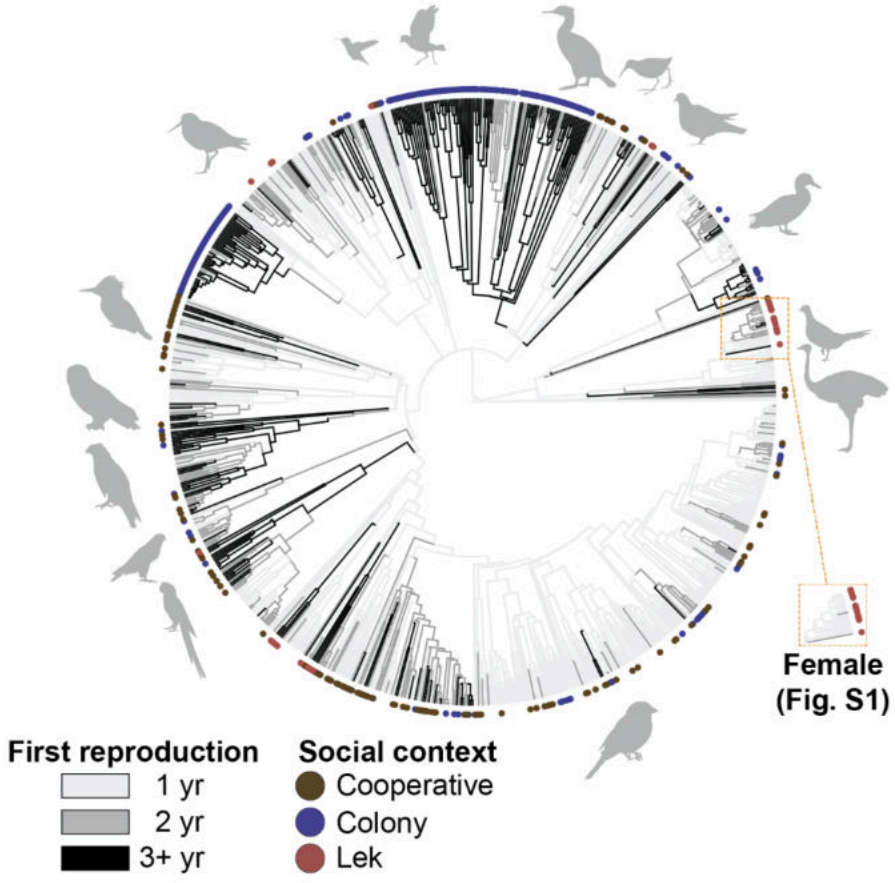
- Wing dimorphism in hummingbirds reduced at high altitude (but dimorphism in other traits increases)



(Beltrán et al. 2022)

Lekking behavior

Leks: Communal display grounds for promiscuous birds with no resources other than the opportunity to mate



https://www.youtube.com/watch?v=cLnbiTkj1TQ

(Taylor et al. 2025)

Hypotheses for lekking



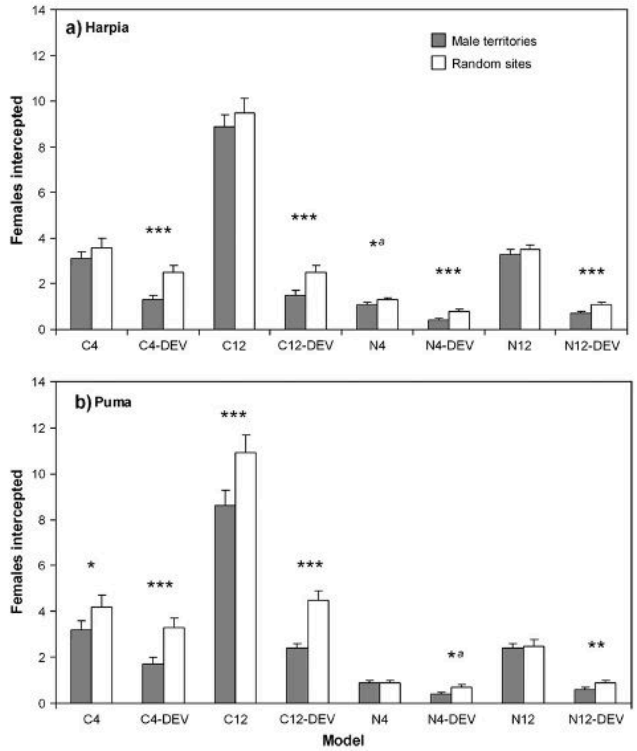
1) **Hot spot model**: Males gather where they're most likely to encounter roaming females
2) **Hot shot model**: Males gather around top males to increase their chances w/in large aggregations
3) **Female preference model**: Females prefer visiting large clusters of males

(Beehler et al. 1988; *Centrocercus urophasianus*)

Is the hot spot model supported in manakins?

- Prediction: males encounter more females at leks than randomly selected sites





(Duraes et al. 2007; https://www.youtube.com/watch?v=1zxJPQIFFTI&t=1s)

a) yes
b) no
c) maybe

References

- Title slide species: *Logapous scotica*, *Turdus ardosiaceus*, *Myiarchus flavidior*, *Vireo gilvus*
- Andersson, M. (1982). Female choice selects for extreme tail length in a widowbird. Nature, 299(5886), 818-820.
- Johnsen, A., Andersson, S., Örnborg, J., & Lifjeld, J. T. (1998). Ultraviolet plumage ornamentation affects social mate choice and sperm competition in bluethroats (Aves: Luscinia s. svecica): a field experiment. Proceedings of the Royal Society of London. Series B: Biological Sciences, 265(1403), 1313-1318.
- Griggio, M., Valera, F., Casas, A., & Pilastro, A. (2005). Males prefer ornamented females: a field experiment of male choice in the rock sparrow. Animal Behaviour, 69(6), 1243-1250.

References

- Mather, M. H., & Robertson, R. J. (1992). Honest advertisement in flight displays of bobolinks (Dolichonyx oryzivorus). The Auk, 109(4), 869-873.
- Møller, A. (1994). Male ornament size as a reliable cue to enhanced offspring viability in the barn swallow. Proceedings of the National Academy of Sciences, 91(15), 6929-6932.
- Ligon, R. A., Diaz, C. D., Morano, J. L., Troscianko, J., Stevens, M., Moskeland, A., ... & Scholes III, E. (2018). Evolution of correlated complexity in the radically different courtship signals of birds-of-paradise. PLoS biology, 16(11), e2006962.
- Madden, J. (2001). Sex, bowers and brains. Proceedings of the Royal Society of London. Series B: Biological Sciences, 268(1469), 833-838.

References

- Nolazco, S., Delhey, K., Nakagawa, S., & Peters, A. (2022). Ornaments are equally informative in male and female birds. Nature Communications, 13(1), 5917.
- Griffith, S. C., Owens, I. P., & Thuman, K. A. (2002). Extra pair paternity in birds: a review of interspecific variation and adaptive function. Molecular Ecology, 11(11), 2195-2212.
- Gonzalez-Voyer, A., Thomas, G. H., Liker, A., Krüger, O., Komdeur, J., & Székely, T. (2022). Sex roles in birds: Phylogenetic analyses of the influence of climate, life histories and social environment. Ecology Letters, 25(3), 647-660.
- Owens, I. P., & Hartley, I. R. (1998). Sexual dimorphism in birds: why are there so many different forms of dimorphism?. Proceedings of the Royal Society of London. Series B: Biological Sciences, 265(1394), 397-407.

References

- Zhou, Y., Pan, Y., Wang, M., Wang, X., Zheng, X., & Zhou, Z. (2024). Fossil evidence sheds light on sexual selection during the early evolution of birds. Proceedings of the National Academy of Sciences, 121(3), e2309825120.
- Beltrán, D. F., Araya-Salas, M., Parra, J. L., Stiles, F. G., & Rico-Guevara, A. (2022). The evolution of sexually dimorphic traits in ecological gradients: an interplay between natural and sexual selection in hummingbirds. Proceedings of the Royal Society B, 289(1989), 20221783.
- Taylor, L. U., Uyeda, J. C., & Prum, R. O. (2025). Social context and the evolution of delayed reproduction in birds. bioRxiv, 2023-08.
- Beehler, B. M., & Foster, M. S. (1988). Hotshots, hotspots, and female preference in the organization of lek mating systems. The American Naturalist, 131(2), 203-219.

References

- Duraes, R., Loiselle, B. A., & Blake, J. G. (2007). Intersexual spatial relationships in a lekking species: blue-crowned manakins and female hot spots. Behavioral Ecology, 18(6), 1029-1039.