



How the manakin got its crown: A novel trait that is unlikely to cause speciation

Gil G. Rosenthal^{a,b,c,1}, Molly Schumer^{b,d,e}, and Peter Andolfatto^f

In a fascinating study, Barrera-Guzmán et al. (1) demonstrate a hybrid origin for the golden-crowned manakin and describe a sexually dimorphic plumage trait derived in the hybrid lineage. However, their work stops short of showing that “the evolution of this unique crown-color signal likely culminated in pre-mating isolation of the hybrid species from both parental species” (1), and indeed, this statement runs counter to theoretical expectations about the role of mate choice in speciation.

For a novel mating signal to facilitate reproductive isolation, it has to promote mating between genetically similar individuals by being more attractive to hybrid choosers and/or less attractive to parentals (2, 3). Hybrids can express signals and preferences that resemble a parent species, are phenotypically intermediate, or are entirely novel (4). When hybrid signals are intermediate and preferences for those signals are also intermediate or otherwise coupled, theoretical (5) and empirical (6) work show mate choice can constitute a “magic trait” that quickly limits gene flow between hybrids and parents.

Instead, Barrera-Guzmán et al. (1) argue that the crown patch of early-generation hybrid males was likely to have been unattractive to females, and that sexual selection secondarily drove the evolution of the novel trait within the hybrid population. This scenario requires processes that are predicted to hinder reproductive isolation between the nascent hybrid species and its progenitors. If the crown evolved due to female preference for overall conspicuousness, as Barrera-Guzmán et al. (1) suggest, this preference was likely shared with heterospecifics (7). Even if the preference for crowns was novel, or

coevolved with the trait, a new model predicts such preferences will introgress into parental populations, facilitating gene flow (8).

Barrera-Guzmán et al. (1) acknowledge that preference for golden crowns could not play a role in the early divergence of the hybrid lineage, and propose a scenario whereby the golden crown and corresponding preference evolved in allopatry but now act to reinforce reproductive isolation after secondary contact. This second claim is untested, and it may be just as likely that secondary admixture has been facilitated, rather than inhibited, by this novel ornament in hybrids. Indeed, in another manakin hybrid complex, shared preferences for a derived male plumage trait have led to its asymmetric introgression (9).

Data on mate choice, and not just sexually dimorphic signals, is critical to understanding the origin and maintenance of this species of hybrid origin. Even if female golden-crowned manakins prefer the derived signal of their own species to that of early-generation hybrids, it is crucial to understand how they respond to signals of the parental species and what parental preferences are.

Barrera-Guzmán et al.’s (1) elegant work on the morphology of the crown has important implications for understanding how hybridization shapes phenotypic evolution. Despite this, evidence is lacking that the crown drove the evolution of reproductive isolation between hybrids and parentals. There is perhaps less reason to expect that “reproductive isolation driven by crown color evolved as a consequence of the admixture event” (1) than there is to expect the opposite, that secondary admixture has been facilitated by this novel ornament.

- 1 Barrera-Guzmán AO, Aleixo A, Shawkey MD, Weir JT (2018) Hybrid speciation leads to novel male secondary sexual ornamentation of an Amazonian bird. *Proc Natl Acad Sci USA* 115:E218–E225.
- 2 Jiang Y, Bolnick DI, Kirkpatrick M (2013) Assortative mating in animals. *Am Nat* 181:E125–E138.

^aDepartment of Biology and Program in Ecology & Evolutionary Biology, Texas A&M University, College Station, TX 77843; ^bCentro de Investigaciones Científicas de las Huastecas “Aguazarca”, Calnali, Hidalgo 43233, Mexico; ^cDipartimento di Scienze della Vita e Biologia dei Sistemi, Università degli Studi di Torino, 10124 Torino, Italy; ^dHoward Hughes Medical Institute, Harvard Medical School, Boston, MA 02115; ^eHarvard Society of Fellows, Harvard University, Cambridge, MA 02138; and ^fDepartment of Ecology and Evolutionary Biology and Lewis-Sigler Institute for Integrative Genomics, Princeton University, Princeton, NJ 08544

Author contributions: G.G.R., M.S., and P.A. wrote the paper.

The authors declare no conflict of interest.

Published under the [PNAS license](#).

¹To whom correspondence should be addressed. Email: grosenthal@bio.tamu.edu.

Published online April 18, 2018.

- 3 Rosenthal GG (2017) *Mate Choice: The Evolution of Sexual Decision Making from Microbes to Humans* (Princeton Univ Press, Princeton, NJ).
- 4 Rosenthal GG (2013) Individual mating decisions and hybridization. *J Evol Biol* 26:252–255.
- 5 Servedio MR (2015) Geography, assortative mating, and the effects of sexual selection on speciation with gene flow. *Evol Appl* 9:91–102.
- 6 Melo MC, Salazar C, Jiggins CD, Linares M (2009) Assortative mating preferences among hybrids offers a route to hybrid speciation. *Evolution* 63:1660–1665.
- 7 Ryan MJ, Keddy-Hector A (1992) Directional patterns of female mate choice and the role of sensory biases. *Am Nat* 139:S4–S35.
- 8 Servedio MR, Bürger R (2014) The counterintuitive role of sexual selection in species maintenance and speciation. *Proc Natl Acad Sci USA* 111:8113–8118.
- 9 Stein AC, Uy JA (2006) Unidirectional introgression of a sexually selected trait across an avian hybrid zone: A role for female choice? *Evolution* 60:1476–1485.