

# Whitney

instead of being shaped by evolution, actually shapes evolution in extraordinary ways. Shockingly, female preference drives the evolutionary engine.

It turns out, according to Prum and his four decades of experience observing manakins in the wild, beauty directs evolution and not the other way around – or rather, female preference for beauty – “aesthetic” selection – acts independent of natural selection. That is to say, beauty expresses health itself. Females choose males with features that indicate resistance to parasites, and resilience. Evidently, shapes “go wonky” or colors “go flat” if a male is not immunologically “buff.”

In fact, this concept of “aesthetic selection,” the idea that female preference directs how species evolve, is not a new idea. It was originally a Darwinian idea, voiced in Darwin’s second book *The Descent of Man, and Selection in Relation to Sex*, first published in 1871. But in the Victorian era, the idea that female preference directed the show made most everyone, especially scientists, uncomfortable and so they rewrote the narrative through omission, claiming that only Darwin’s concept of natural selection held the key to evolution.

Darwin’s ideas were so revolutionary, critics eventually accused Darwin of being a traitor to his own legacy by suggesting there was another independent mechanism called beauty. As Prum said, the case demonstrates that science, too, has cultural bias, when it chooses ideas it approves of but disregards the rest. After 40 years of field work, Prum aims to “bring beauty back into the sciences” by animating Darwin’s original, and very unpopular, ideas about aesthetics and mate selection to “elevate beauty to a mainstream subject of scientific concern.”

Prum has spent his career studying manakins – 40 species of manakins in 12 neotropical countries. He has observed divergent expressions of beauty from elaborate courting dances to wild birdsong to singing with wings, literally. Instead of thinking of all of the species on earth as being “victims” of evolutionary change, Prum

– and Darwin before him – argues that life itself, in all its forms, shapes evolution through seemingly “useless” beauty. And beauty can be easily observable or hidden totally until called forth for mating, or it can be exceedingly, mind-bogglingly odd and complex, as in the case of the male club-winged manakins that sing with their wings.

Prum: “Why would any species – let alone many separate species – evolve an entirely new way to sing when the traditional avian vocal songs had been working fine, even gloriously, for over 70 million years?”

Even after 20 years of field observation, Prum could not believe his eyes or his ears or his mind. But a new technology – high-speed video – finally convinced him otherwise, but also presented more enigmas. It turns out that the manakin’s wing song did not make sense – acoustically. The frequency of the wing oscillation is nearly 100 cycles per second, but the frequency of the wing song is about 1,500 cycles per second, or 1,500 times that – a pitch between high F-sharp and high G, or about one musical fifth above high C. How was that possible?

Prum’s graduate student Kimberly Bostwick deciphered the mystery – in the shape and character of secondary feathers that have a series of tiny ridges at the contact surface which, in motion with the feather blade actually create a resonator. Feathers rubbing against each other act like a bow on a violin or fingers strumming the tines of a comb such that coupled oscillations even serve to amplify the wing song. Female preference for this wing song actually changed the wings and bones of the male in order to make this unlikely sound possible.

What other lessons does beauty contain?

Beauty radiates across time and distance. Prum studied three different subspecies of manakins over decades and thousands of miles apart. By studying divergent expressions of beauty – from the above-the-canopy dive-bomb, backward, courting dance of the white-throated manakin to the side-to-side bowing dance of the golden-winged manakin, to the double snap jump of the pin-tailed manakin – Prum was able to decipher the manakin “family tree”

of beauty – demonstrating how beauty itself had evolved divergent, but connected species and could radiate even as it changed form.

Prum’s research eventually led him to consider how the evolution of beauty contributed to the evolution of feathers? An even more remarkable story of beauty harkens back to the dinosaurs. Careful study of paleontological data from fossil dinosaur feathers and experimental tests of molecular mechanisms of feather development – a field called developmental evolution – has overturned the century-old hypothesis that wings evolved for the purpose of aerodynamics – for the purpose of gliding and flight. Developmental evolutionary biologists now believe that feathers evolved for other reasons – prior to flight.

Feathers evolved in stages – from hollow tubes to downy tufts with increasing complexity. Eventually, tufts evolved into two-dimensional planar feathers – ostensibly a canvas-like surface for the presentation of pigments and patterns – that is, to present beauty. After the planar surface – the feather vane – evolved, and eventually allowed birds to fly. Prum: “Saying that feathers evolved from flight is like saying that digits evolved to play the piano.”

One more kicker for beauty. About 66 million years ago, an enormous meteor hit the earth, leaving a crater 110 miles wide near what is now Chicxulub, Mexico. We now know that the dinosaurs did not simply “disappear” or go extinct. Rather three distinct dinosaur lineages survived mass extinction. These three lineages would later evolve into the 10,000 species of birds that inhabit the earth today.

The only dinosaurs that survived were those that could fly. Prum: “Thus, the potentially aesthetic innovation of planar feathers facilitated the evolution of flight and the avian dinosaur survival of the Cretaceous-Paleogene extinction. It’s harder to imagine a bigger possible impact for the role of beauty and desire in the history of life.”

“Useless” beauty? Far from it.

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