

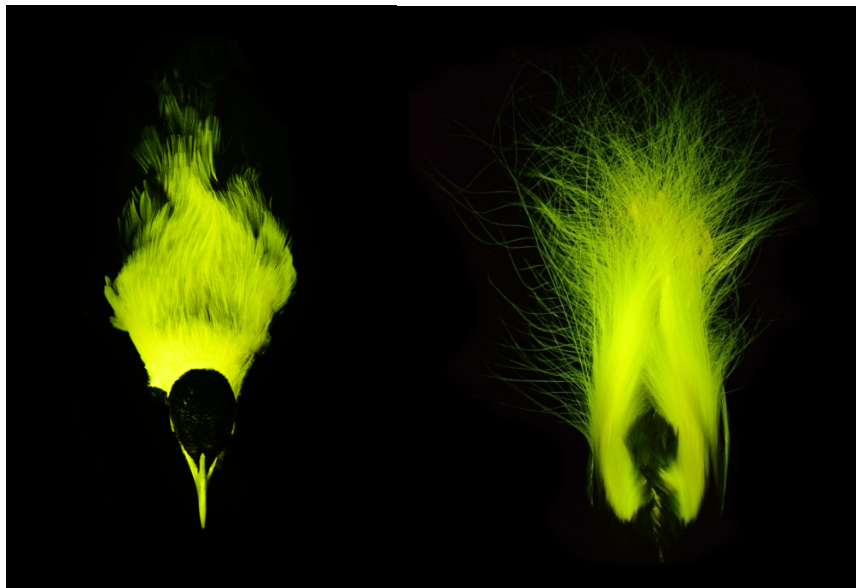
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Study Finds That Birds-of-Paradise Are Biofluorescent

Research suggests that “hidden” phenomenon provides enhanced signaling for hierarchy and courtship displays



New research by scientists at the American Museum of Natural History and the University of Nebraska-Lincoln reports, for the first time, the widespread occurrence of biofluorescence in birds-of-paradise. The study, based on Museum specimens collected since the 1800s, finds biofluorescence in 37 of the 45 known birds-of-paradise species and suggests that this special “glow” is important among males for hierarchy and mating displays. The research is published today in the journal *Royal Society Open Science*.

“The unique mating rituals and displays of birds-of-paradise have fascinated scientists and spurred a myriad of studies focused on trait evolution and sexual selection,” said the study’s lead author Rene Martin, an assistant professor at the University of Nebraska-Lincoln who conducted this work when she was a postdoctoral researcher at the Museum. “It seems fitting that these flashy birds are likely signaling to each other in additional, flashy ways.”

Biofluorescence is a phenomenon that occurs when an organism absorbs light, transforms it, and emits it as a different color. In recent years, Museum Curator John Sparks, an ichthyologist, and his colleagues have identified previously unknown biofluorescence in hundreds of species across the tree of life, with a

particular focus on fishes. Using a specialized photography setup with ultraviolet and blue lights and emission filters, the researchers have captured biofluorescence in animals ranging from sharks to turtles to corals. About a decade ago, Sparks worked closely with Museum ornithologists to search for biofluorescence in the Museum's vast collection among a subset of birds that are known for their courtship displays.

"Despite there being over 10,000 described avian species, with numerous studies that have documented their bright plumage, elaborate mating displays, and excellent vision, surprisingly very few have investigated the presence of biofluorescence," Sparks said.

Bowerbirds and fairy wrens failed to glow, but among birds-of-paradise, Sparks found bright green-yellow fluorescence. Sparks' initial work was continued recently by Martin and Emily Carr, a Ph.D. student in the Museum's Richard Gilder Graduate School. Together, the team took a closer look at biofluorescence in birds-of-paradise, which live across eastern Australia, Indonesia, and New Guinea, finding that the birds also fluoresce when exposed to UV light, not just blue light. This phenomenon is especially prominent in males, focused on their bright plumage and skin in areas that are highlighted during displays: the inner mouth and bill, feet, and feathers on the head, neck, and belly. In females, biofluorescence is usually restricted to plumage on the chest and belly.

"These birds live near the equator, where there is an abundance of bright solar light year-round, and they live in forests where the complexity of light is significantly affected by differences in the canopy and where biofluorescent signals may be enhanced," Carr said.

Studies based on closely related species found that the pigments in the birds' eyes align with the fluorescence peaks that the researchers measured. Based on this, the authors infer that birds-of-paradise can see these biofluorescent patterns, which enhance contrast against dark plumage and possibly play an important role in courtship and hierarchy.

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The American Museum of Natural History, founded in 1869 with a dual mission of scientific research and science education, is one of the world's preeminent scientific, educational, and cultural institutions. The Museum encompasses more than 40 permanent exhibition halls, galleries for temporary exhibitions, the Rose Center for Earth and Space including the Hayden Planetarium, and the Richard Gilder Center for Science, Education, and Innovation. The Museum's scientists draw on a world-class permanent collection of more than 30 million objects and specimens, some of which are billions of years old, and on one of the largest natural history libraries in the world. Through its Richard Gilder Graduate School, the Museum offers two of the only free-standing, degree-granting programs of their kind at any museum in the U.S.: the Ph.D. program in Comparative Biology and the Master of Arts in Teaching (MAT) Earth Science residency program. Visit amnh.org for more information.

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Images:

Biofluorescence seen on an emperor bird-of-paradise (*Paradisaea guilielmi*) in the Museum's collection showing the top of the bird (left) and its plumage (right).

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