

EXCEPTIONAL PLUMAGE OF A FEMALE ANNA'S HUMMINGBIRD IN LOS ANGELES

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ABSTRACT: Hummingbirds are often sexually dimorphic, the males of many species showing an ornamental gorget that females lack. Males use this ornamental plumage to attract mates and establish a territory, while females build nests and care for the young alone. In Los Angeles, California, we observed a nesting Anna's Hummingbird with male-like plumage on the crown and gorget but the rectrix morphology of a female—and it reared chicks. The extent of gorget development on this individual likely represents one of the most extreme examples of a male-plumaged female hummingbird yet documented.

Sexual dimorphism is widespread among birds; differences in size, plumage, and behavior provide each sex with the ability to focus on different aspects of reproduction (Owens and Hartley 1998). Most species of hummingbirds (Trochilidae) are sexually dimorphic and polygynous, the males showing bright ornamental plumage to attract multiple females (Berns and Adams 2013). Hummingbirds do not form pair bonds, and typically males do not participate in nest building or provide any parental care to offspring.

Nevertheless, there are observations of male hummingbirds near nests and even a few records of male-plumaged birds interacting with the nest or nestlings. Moore (1947) reported observations of male hummingbirds at nest sites from both the literature and personal experience. Unusual behaviors he noted included a male Tyrrian Metaltail (*Metallura tyrianthina*) building a nest and a male Sparkling Violetear (*Colibri coruscans*) appearing to attempt to incubate eggs after the female was killed. In both cases Moore (1947) collected the birds and sexed the specimens by their gonads. Apart from these two examples, there are no reports of confirmed male hummingbirds tending to a nest or offspring. However, males of certain species routinely visit nests for courtship, and their activity could be mistaken for parental care. For instance, male Mexican Sheartails (*Doricha eliza*) routinely seek out nesting females and perform courtship displays to the female as she sits on the nest (Díaz et al. 2011).

Here, we report an observation of a nesting female Anna's Hummingbird (*Calypte anna*) with male-like plumage. Anna's Hummingbird is a common species in western North America whose range has been expanding in recent decades (Battey 2019). Adult males in definitive basic plumage have a fully iridescent rose-colored crown and gorget and narrow black outer rectrices. Adult females typically have some rose-colored feathers in the center of the throat but only rarely have any iridescent feathers in the crown; their outer rectrices are blunt with white tips (Clark and Russell 2020, Pyle 2022).

On 30 April 2022 at 07:11 PDT, Campbell was photographing migrating and nesting birds on the campus of Occidental College in Los Angeles, California (34.1262° N, 118.2134° W). He observed an Anna's Hummingbird building a nest

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NOTES

approximately 3 m above the ground in an olive tree (*Olea europaea*) along a sidewalk (Figure 1). Photographs and video of the hummingbird revealed an extensive gorget, which raised the possibility that this could be a male tending to the nest. On 8 May 2022 at 08:15 PDT, Campbell returned to record additional videos of the hummingbird and its nest. The nest was near completion, but the hummingbird still occasionally added materials. On 24 and 25 May, Wong, Campbell, and Lyon once again saw and photographed the hummingbird sitting on the nest. Throughout May and early June, Mutchler and Campbell recorded the hummingbird brooding and provisioning two nestlings and obtained several additional photos (<https://ebird.org/ebird/view/checklist/S195067903>, <https://ebird.org/ebird/view/checklist/S111589260>, <https://ebird.org/ebird/view/checklist/S113379012>). Over the next three weeks, Campbell casually monitored the nest. Typically, the hummingbird was seen sitting on the nest, and if not present, usually returned within 15 minutes. It was once noted sleeping on the nest at night. While other Anna's Hummingbirds were present in the area, out of more than 10 total hours of observation across all observers, no other hummingbird was ever observed interacting with the nest.

In consultation with Clark on 27 May, we identified the hummingbird as female from the shape and pattern of its blunt white-tipped rectrices (Figure 2). The tail feathers of a juvenile male resemble those of adult females (Figure 2; Williamson 1956) but are narrower with the white less extensive. The nesting bird also had incomplete iridescent feathering on the crown and lacked lateral extensions to the gorget—traits typical of adult males (Pyle 2022). The hummingbird was not collected so we could not confirm the sex by dissection.

A female Anna's Hummingbird with such an extensive male-like iridescent gorget and crown feathering is noteworthy. The individual we describe had iridescent gorget and crown feathering that appeared nearly 50% more extensive than the most extensive iridescent feathering among the 485 female specimens examined by Clark et al. (2022). The initial misidentification of this individual as male suggests potential difficulty in sexing of some Anna's Hummingbirds, depending on the prevalence of male-plumaged females. For example, Clyde (1972) recounted a male-plumaged Anna's Hummingbird feeding a nestling multiple times over two days, but the bird was not collected and its sex was inferred from the gorget plumage alone.

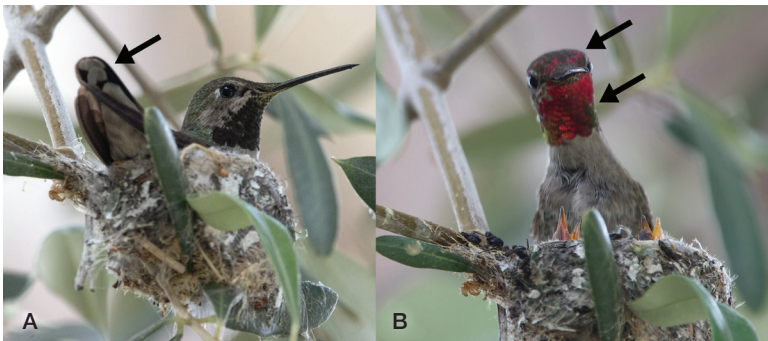


FIGURE 1. Anna's Hummingbird with male-like plumage at Occidental College in Los Angeles, California. (A) Incubating eggs on 8 May 2022. Ventral view of the rectrices shows their rounded shape and white tips, consistent with an adult female. (B) Preparing to feed nestlings on 27 May 2022. Frontal view shows extensive iridescent feathering in the gorget and crown.

Photos by Russell M. L. Campbell

NOTES



FIGURE 2. Tails of specimens of Anna's Hummingbird at the Natural History Museum of Los Angeles County show how the shape and color of the rectrices of an adult female (left, LACM 2824), juvenile male (center, LACM 7886), and adult male (right, LACM 2795) differ as viewed from below. Note the blunt white-tipped rectrices of the female and narrow dark outer rectrices of the male. The rectrices of the juvenile male are similar to those of an adult female, but the tips are not as broad and the white is less extensive.

Photo by Russell M. L. Campbell

Sexual selection is the best-understood mechanism driving sexual dimorphism. Females choose among males competing for opportunities to mate, thereby determining which alleles are expressed in the population (Majerus 1986). In birds, this often results in plumage dimorphism, males developing bright ornamental plumage that attracts the more cryptic females (Berns and Adams 2013). Hummingbirds' polygynous mating system has likely further contributed to their sexual dimorphism, as males attempt to attract and mate with many females (Nuñez-Rosas et al. 2017). However, in species such as the Anna's Hummingbird, females still develop small amounts of ornamental plumage (Clark and Russell 2020). Although the mechanism behind the large number of iridescent feathers of this individual is unknown, prior research into intraspecific variation in females' plumage has elicited multiple hypotheses, including intralocus sexual conflict. Intralocus sexual conflict is the increased expression of the male phenotype in females or the female phenotype in males. When a trait like a male hummingbird's gorget is favorable, the alleles responsible for its expression become more prevalent in the genome and could potentially be expressed in the other sex. Another hypothesis for variation in female hummingbirds' plumage is intraspecific competition for resources (Amundsen 2000, Clark and Rankin 2019). On the basis of their study of the White-necked Jacobin (*Florisuga mellivora*), Falk et al. (2021) hypothesized that iridescent plumage in hummingbirds evolved through intraspecific competition for resources, in which individuals with more male-like plumage are more successful while foraging through reduced aggressive and sexual interactions with males. Thus the evolution of iridescence in hummingbirds might have originated as a signal unrelated to sexual selection. For example, females of monomorphic species like the Fiery-throated Hummingbird (*Panterpe insignis*), Purple-throated Carib (*Eulampis jugularis*), and Green-throated Carib (*Eulampis holosericeus*) behave territorially to males during the nonbreeding season (Wolf 1969, 1975, Bleiweiss 1985, 1992). Evidence also suggests female birds can develop secondary sexual characteristics that influence males' mate choice or signal dominance (Amundsen 2000).

Females with male-like plumage occur widely among birds, making their documentation and analysis broadly relevant. In waterfowl (Anseriformes), plumage dichromatism is likely dependent on the presence of estrogen suppressing the de-

NOTES

velopment of male-like traits. Female ducks develop male-like plumage when their estrogen production is reduced, and male ducks show higher levels of estrogen when molting into their female-like “eclipse” plumage (Mueller 1970, Kimball and Ligon 1999). Johns (1964) described how in shorebirds (Charadriiformes), testosterone results in the development of brighter plumage. Phalaropes (*Phalaropus* spp.) show a sex-role reversal, females having brighter alternate plumage than do males and requiring testosterone to attain this plumage (Johns 1964). On the basis of our observation, an alternative explanation of observations of male-plumaged hummingbirds attending to nests is the misidentification of females exhibiting male-like plumage. Further exploration into the incidence and extent of female plumage variation will help clarify why such variation occurs and how it is related to the evolution of sexual dimorphism in birds.

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NOTES

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