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### HIGH INCIDENCE OF COLOR ABERRATIONS IN THE PLAIN-FLANKED RAIL (*RALLUS WETMOREI*)

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**Alta incidencia de aberraciones de color en la Polla de Wetmore (*Rallus wetmorei*).**

**Key words:** Color aberration, Plain-flanked Rail, progressive greying, *Rallus wetmorei*, Venezuela.

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#### INTRODUCTION

The development of white feathers is a common phenomenon in wild birds. Leucism and progressive greying are two color aberrations, in which melanin production is partly blocked, thus causing the presence of white feathers in birds (van Grouw 2013). These color aberrations are frequently confused and usually difficult to separate in the field. Leucism is a genetic disorder altering the production of pigments (eumelanin and/or pheomelanin) in the feathers because of the absence of pigment-producing cells in the skin (McCardle 2012, van Grouw 2013). Pigment absence in leucistic birds can be partial or total (i.e., leucism can vary from only a few white feathers to totally white individuals, van

Grouw 2013) without significant changes throughout their life cycle. In contrast, progressive greying results in the progressive loss of pigment-producing cells with age. In leucistic birds, white feathers are already present in the juvenile plumage and will never change during life while in progressive greying the juvenile plumage is normal, and the white feathers appear later in life (van Grouw *in litt.*). This aberration may be caused by genetic disorders causing the loss of pigment cells or by external non-heritable factors, such as diseases, and habitat or food deficiency (van Grouw 2013). Birds with progressive greying exhibit only a few white feathers on early stages, but the amount of white feathers increases after every moult cycle and the whole plumage can become white (van

Grouw 2013). In both leucism and progressive greying the eyes retain their color but leucistic birds have colorless skin in the affected skin areas whereas the skin of birds affected by progressive greying has normal color (van Grouw 2013). The pattern of white feathers in the body can be useful to distinguish between leucism and progressive greying in wild birds. Leucism often generates a patchy and bilaterally symmetrical pattern of white feathers, usually in the wings, belly, and head, while white feathers during early stages of progressive greying are randomly distributed, mainly on the head, back, and flanks (van Grouw 2013, 2014).

Within Rallidae, color aberrations causing the presence of white feathers have been reported for some species both in tropical and temperate regions: Ecuadorian Rail (*Rallus aequatorialis*) (Henry 2005), White-winged Coot (*Fulica leucopetra*) (Zapata & Novatti 1979), Andean Coot (*F. ardesiaca*) (Henry 2005, Nolasco 2010), Eurasian Coot (*F. atra*) (van Grouw 2006), and Common Moorhen (*Gallinula chloropus*) and Weka (*Gallirallus australis*) (van Grouw 2014). Progressive greying within this bird family, however, has only been confirmed for Eurasian Coot, Common Moorhen, and Weka (van Grouw *in litt.*), and for the now extinct population of the Purple Gallinule (*Porphyrio porphyrio*), from Lord Howe Island. The latter was long considered a separate taxon, the Lord Howe Gallinule (*P. albus*), until recent specimen analysis indicated that these are individuals of the former exhibiting different stages of progressive greying (Hume & van Grouw 2014). Because this color aberration has been described very recently, it is possible that additional species of rails and crakes may exhibit it, and that earlier reports of leucism within Rallidae rather correspond to progressive greying than to leucism.

The Plain-flanked Rail (*Rallus wetmorei*) is restricted to mangrove forests located in the

central coast of Venezuela (Hilty 2003), where it is currently found in five localities (Rodríguez-Ferraro *et al.* in prep.). This rail is considered Endangered at national (Rodríguez & Rojas-Suárez 2008) and global (BirdLife International 2000, IUCN 2014) scales, respectively. Main threats faced by this rail are the loss and deterioration of mangrove habitat as a consequence of expanding touristic developments and activities derived from petrochemical industries and harbors (Rodríguez & Rojas-Suárez 2008). Two different color morphs have been reported for this species: a pale one, characterized by a brown color, heavily streaked darker brown above and paler on vent and undertail coverts, and a dark morph, which is characterized by a homogeneous color in all parts of the body that can be dark sepia to fuscous (Hilty 2003, Restall *et al.* 2007). Here, we report observations of progressive greying in individuals of the Plain-flanked Rail.

## METHODS

As a part of a larger project on the ecology and population genetics of the Plain-flanked Rail, we conducted observations and captured rails at five localities in the central coast of Venezuela (Fig. 1): La Ciénaga, Aragua state (10°28'40.9"N, 67°48'38.4"W); Patanemo, Carabobo state (10°27'7.95"N, 67°55'33.44"W); Tucacas (10°47'50.7"N, 68°18'22.9"W), Morrocoy National Park (10°51'27.9"N, 68°18'27.5"W), and Cuare Wildlife Refuge (10°56'08.9"N, 68°18'21.5"W), all three in Falcón state. Field work was conducted on April 2010; May–July 2012; February and July 2013; February, July, and December 2014; and January–February 2015. At each locality we searched for rails using play-back calls (Boesman 2006) with an iPod® connected to a Radio-Shack Mini Amplifier Speaker®. Rails were captured using mist-nets (12 m x 2.5 m, 61 mm mesh size) set in mangrove forests,

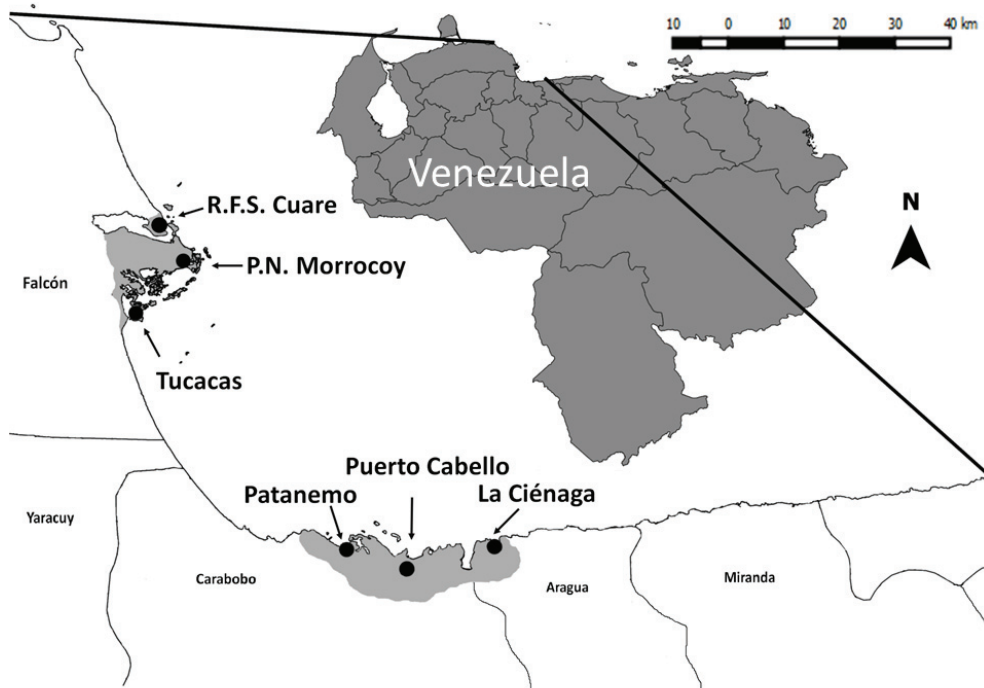


FIG. 1. Map of northwestern Venezuela, indicating localities where Plain-flanked Rails were observed and captured (black circles). Shaded areas indicate the distributional range of the species.

where individuals were previously seen or heard. When we observed or captured a rail with white feathers, we recorded the part of the body affected and the extent of progressive greying. When a rail with white feathers was observed in the field, we also recorded whether it was alone or with other individual, as well as its interactions with other rails and any breeding activity. Additionally, we examined 18 museum specimens deposited at Colección Ornitológica Phelps (COP), and recorded the presence of white feathers on them. These specimens were collected between 1943 and 1951 at La Ciénaga, Tucacas, and in a sixth locality, the Port of Borburata and Puerto Cabello ( $10^{\circ}28'N$ ,  $68^{\circ}00'W$ ) in Carabobo state, which we did not visit because mangrove forests no longer exist there.

## RESULTS AND DISCUSSION

During fieldwork, we captured 17 Plain-flanked Rails (7 pale and 10 dark morphs) at four localities (six in Morrocoy N. P., five in Patanemo, five in Cuare Wildlife Refuge, and one in Tucacas). Four of the dark-morph individuals showed progressive greying in different parts of their bodies, this represents 24% of all individuals captured and 40% of all dark morphs captured. The amount of white feathers varied considerably among individuals, ranging from a few small feathers (Fig. 2A) to extensive progressive greying (Figs 2B–C). Four rails showing this color aberration were captured at two localities. Two individuals were from Morrocoy National Park, of which one (30 May 2012) had white feathers on its head and neck (Fig. 2A), and another (22



FIG. 2. Plain-flanked Rails showing progressive greying: A) Captured individual with few white feathers in head and neck at Morrocoy National Park (photo by A. Rodríguez-Ferraro). B) Captured individual with white secondary feathers, wing covers, and back at Cuare Wildlife Refuge (photo by V. Morón). C) Captured rail with extensive leucism in head and body feathers at Cuare Wildlife Refuge (photo by L. M. Montilla). D) Individual at La Ciénaga showing leucistic feathers in head, back, and rump (photo by D. García).

February 2013) had white feathers on the neck and some white primaries. Two other rails, captured at Cuare Wildlife Refuge, showed extensive progressive greying: one (28 June 2014) had white color on two secondary feathers in both wings, wing covers, head, back, rump, and tail (Fig. 2B), whereas the other individual (16 December 2014) presented white feathers in its head, neck, breast, and back (Fig. 2C).

We have also observed wild individuals with progressive greying at three localities: one with white feathers on its head at Morrocoy National Park (23 February 2013); one with white wing covers in Patanemo (12 July 2013); and two in Tucacas: one individual

observed on 9 February 2014 had white feathers on its left shoulder, whereas the other individual, observed on 6 February 2015, had white feathers on the rump. An additional individual with white feathers in several parts of its body (head, neck, and back) was observed and photographed at La Ciénaga (16 September 2007; D. García pers. comm., Fig. 2D). All these records were from dark-morph individuals; we have not observed, or have reports of progressive greying from, wild pale-morph individuals.

From museum specimens, only one individual, a pale-morph female (COP 31123), has white feathers on its head, neck, and back (Fig. 3). This individual was collected in

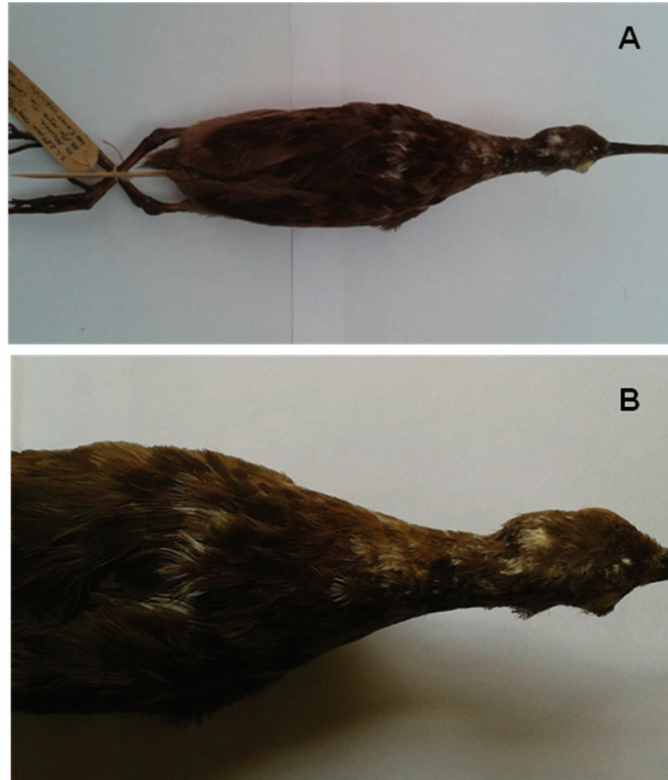


FIG. 3. Museum specimen (COP 31123) of a pale-morph Plain-flanked Rail from Puerto Cabello, showing progressive greying on head, neck, and back. A) Whole specimen, B) Detail of area with white feathers (photo by A. Rojas).

Puerto Cabello (22 September 1945). Another specimen of a pale Plain-flanked Rail showing a white feather on its neck is deposited in the Natural History Museum at Tring, UK (BMNH 1959.2.1). This specimen is a male, and was collected in Tucacas, Falcón state (15 May 1951) (van Grouw *in litt.*).

Results from observations, captures, and examination of museum specimens show that progressive greying occurs at six localities from where the Plain-flanked Rail has been reported, and affects both morphs, although it seems more common in dark-morph individuals. The high frequency of color aberrations, such as melanism, leucism, and

progressive greying, has been associated with isolated populations (van Grouw 2014) and elevated levels of inbreeding after a genetic bottleneck (Bensch *et al.* 2000). As most of the remaining populations of the Plain-flanked Rail are disjunct and presumably small, it would be interesting to conduct a large-scale geographic study to examine whether levels of progressive greying in this species may be related to genetic or environmental factors.

Wild birds with color aberrations on their plumages are expected to have decreased longevity resulting from increased rates of predation and intraspecific aggression (Holt *et al.* 1995). However, we were unable to observe

aggression from conspecifics towards color aberrant rails. Adult individuals with color aberrations were reported as regular breeders from penguins (Forrest & Naveen 2000, Voisin *et al.* 2002, Everitt & Miskelly 2003), alcids (Sealy 1969), boobies (Castillo-Guerrero *et al.* 2005), and geese (Owen & Shimmings 1992). For Plain-flanked Rails showing progressive greying, this seems to be also the case, because all of the individuals we observed or captured paired with individuals with normal plumages, and for some of them we had evidence of breeding. During three days, 27–29 June 2014, when we observed a nest of the Plain-flanked Rail containing four eggs, incubation was performed by both members of the pair, a pale-morph and a dark-morph individual with white feathers, which was captured later (Fig. 2B). A dark-morph male showing progressive greying, observed in Tucacas on 6 February 2015, was seen copulating twice with another dark-morph individual with normal plumage.

Our results indicate that progressive greying is a common color aberration in Plain-flanked Rails, being detected in all localities where the species is present and affecting individuals of both sexes and both color morphs. Detailed studies are needed to determine the frequency of this color aberration in each locality. Additionally, behavioral observations should be conducted because these may provide important evidence regarding survival and reproductive success of individuals showing progressive greying.

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