

OBSERVATIONS OF PLUMAGE PIGMENT ABERRATIONS OF BIRDS IN ECUADOR, INCLUDING RAMPHASTIDAE

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Abstract

The occurrence of plumage pigment aberrations, particularly leucism and to a lesser extent melanism and schizochroism, is well documented in birds yet rarely observed in nature. Documenting cases will help to understand how these aberrations vary among taxa, habitats, and regions. We observed four cases of leucism in four different species: *Coragyps atratus*, *Catharus swainsoni*, *Turdus fuscater*, and *Parula pitiayumi*, one case of schizochroism in *Pteroglossus erythropygius*, and one case of erythromelanism in *Sporophila corvina*, all from various localities in Ecuador.

Key Words: Ecuadorian birds, leucism, melanism, schizochroism, plumage aberrations

Resumen

La ocurrencia de aberraciones en el pigmento del plumaje de aves han sido bien documentadas en aves, en particular el leucismo y en menor grado el melanismo y el schizochroismo. Observamos cuatro casos de leucismo en cuatro especies diferentes: *Coragyps atratus*, *Catharus swainsoni*, *Turdus fuscater*, y *Parula pitiayumi*, un caso de schizochroismo aparente en *Pteroglossus erythropygius*, y un caso de erythromelanismo en *Sporophila corvina* en varias localidades en Ecuador.

Palabras clave: Aberraciones del pigmento, aves ecuatorianas, leucismo, melanismo, schizochroismo

Introduction

Genetically controlled aberrant plumage patterns in birds present novel plumage phenotypes important for evolution and provide human observers with identification challenges (see Table 1). The major aberrant plumage conditions are defined by Buckley (1982), and include albinism, leucism, melanism, schizochroism, carotenism and dilution. Albinism is the most severe and easily defined aberration, the complete loss of all pigments in plumage and other body parts, resulting in birds with white plumage and a lack of pigment in their eyes, bills, skin, legs and feet. Similarly leucism, incorrectly known as partial albinism, is the complete loss of particular pigments in some or all feathers (Buckley 1982), resulting in pure white feathers. Unlike albinism, pigments in other parts of the body are unaffected. Melanism occurs when there is an overabundance of melanin in feathers or melanin replacing other pigments, causing feathers that are typically different colors to be black or dark sooty gray (Buckley 1982, 1987). Erythromelanism, often known as erythrism, is a case of melanism where reddish or rufous erythromelanin replaces other forms of melanin (Buckley 1982) or is deposited in feathers that normally

lack melanin. Combinations of two melanins (eumelanin and phaeomelanin) and xanthophylls are often important in feathers, and a mutation disrupting the pathway of one can produce schizochroism (Buckley 1982, Harrison 1963). Lack of eumelanin (non-eumelanin schizochroism) results in fawn plumage, and lack of phaeomelanin (non-phaeomelanon schizochroism) results in gray individuals (Buckley 1982, Harrison 1963). Carotenism describes any abnormality in degree or distribution of carotenoid pigments, including the replacement of melanins by carotenoids, whereas the replacement of carotenoid pigmented feathers with white feathers is non-carotenoid leucism (Buckley 1982). Finally, dilution describes an equal reduction in quantity of all pigments resulting in a uniform reduction of color intensity in plumage (Buckley 1982) and is apparently a condition of the entire plumage, not of single feathers. Dilution is difficult to diagnose and may be confused with other conditions, such as schizochroism (Buckley 1982). Combinations of non-mutually exclusive aberrant plumage conditions (e.g. leucism and melanism) can occur among different feathers within the same individual bird (Buckley 1982).

These aberrations are very common in domesticated forms of birds, but are rarely observed in many natural populations where aberrant

plumage is selected against (Ellegren *et al.* 2000, Slagsvold *et al.* 1988). In contrast, plumage pigment aberrations often result in highly visible plumage differences that could be selected for in populations. Buckley (1982) suggests that leucism may be responsible for white morphs seen in polymorphic species and may be responsible for the origin of totally white monomorphic species such as egrets. Leucism may have led to variable amounts of white in the plumage in several groups hypothesized to have low dispersal rates and isolated small populations such as *Scytalopus* (Krabbe & Schulenberg 2003), *Cinnycerthia* (Brumfield & Remsen 1996), and *Troglodytes cobbi* (Kroodsma & Brewer 2005). Similarly, variable amounts of melanism occur in isolated populations of *Coereba flaveola*, and all black birds predominate on St. Vincent and Grenada in the Caribbean (Raffaele *et al.* 1998). Also, melanism and erythromelanism contribute to polymorphism among several genera including *Buteo* (Thiollay 1994) and *Stercorarius* (O'Donald 1987), which have light and dark (melanistic) morphs, as well as reddish morphs in *Megascops* (Marks *et al.* 1999) and female *Cuculus* (Payne 1997).

The causes of leucism and melanism are often attributed to the expression of mutant alleles (Baker

1991, Bensch 2000) or deviations in gene expression that disrupt the pigmentation at feather development (Møller & Moussaëu 2001). Melanism was shown to be associated with the number of copies of variant alleles of the melanocortin-1 receptor gene among Anseriformes, Charadriiformes and Passeriformes (Mundy *et al.* 2003, Theron *et al.* 2001). In addition, plumage abnormalities have also been attributed to diet (Buckley 1982, Clapp 1974, Sage 1962), and trauma to feather follicles from injuries or disease (Phillips 1954). Multiple types of plumage aberrancies in the same individual may indicate a genetic defect influencing several pigmentation systems (Buckley 1982).

We present descriptions, photos, and illustrations to document plumage aberrations in six species of birds from various sites in Ecuador.

Species accounts

Black Vulture - *Coragyps atratus*

On 30 October 2005, one leucistic individual was observed soaring low in a kettle with 20 typically plumaged birds in the small city of Piñas (3°42' S 79°42' W) in El Oro province. The bird was on the edge of a small urban area in heavily disturbed dry deciduous woodland and scrub, at 1200 m.a.s.l. The plumage was mostly white, with normal black feathers restricted to the tail and tarsi (Fig. 1). The undertail

coverts were a mix of black and white, with fewer white feathers in

the more distal undertail coverts. Skin pigments appeared un-affected.



Figure 1. Leucistic *Coragyps atratus*, illustration by DJL from field notes and sketches by PAH.

**Pale-mandibled Aracari -
*Pteroglossus erythropygius***

On 22 August 2005, one aberrant individual with off-white

to pale buff plumage was observed in a flock of 10 typically plumaged conspecifics at the Mindo Cloudforest Foundation's Milpe Reserve, 4 Km E of Los Bancos, Pinchincha province (0°02'

S 78°52' W). The bird was in humid subtropical forest edge at 1100 m.a.s.l. All of the typically black and greenish-black plumage (Fig. 2) was replaced by a uniform whitish pale cream color (Figs. 3, 4). The buff appearance to the feathers is uniform over the entire bird, and it seems this is due to a pigment (possibly phaeo-melanin) in the feathers rather than from staining or

wear. The bright red and yellow carotenoid pigments of the bird's plumage appeared normal, however the skin pigments around the eye were duller, unlike the bright red skin color typical of this species. The bill pattern was also slightly paler overall with a slightly reduced amount of black pigment compared to typical birds (Fig. 2).



Figure 2. Typical *Pteroglossus erythropygius*, from Jatun Sacha Bilsa, Esmeraldas province, Ecuador, photos by PAH.



Figure 3. Ventral view of aberrant *Pteroglossus erythrogygius*, photos by PAH.



Figure 4. Dorsal view of aberrant *Pteroglossus erythrogygius*, photo by PAH.

Great Thrush - *Turdus fuscater*

On 27 October 2005, a leucistic male was observed along the road just outside the village of Yangana, in Loja province (4°23' S 79°11' W) in agricultural land. The plumage of the bird was typical except for a single white primary (P8).

Swainson's Thrush - *Catharus ustulatus*

On 12 and 13 December 2005, a leucistic adult was seen foraging on a wide trail within montane forest at the Bombuscaro sector of Parque Nacional Podocarpus (4°08' S 79°00' W). The plumage was normal except for a small patch of

feathers approximately 10 x 3 mm on the center of the nape, reminiscent of the white crown patch of many *Elaenia* flycatchers. The plumage did not appear disrupted and we believe this white patch consisted of white feathers rather than missing feathers revealing pale skin or feather bases below normal plumage.

Tropical Parula - *Parula pitiayumi*

On 19 December 2005, a leucistic female was observed foraging in secondary woodland at Fundación Jocotoco's Reserva Buenaventura, El Oro province (3°33' S 79°59' W). Several small white patches were present on the forecrown and around the eyes suggesting eyerings (Fig. 5).



Figure 5. A typical male *Parula pitiayumi* (left) and a leucistic female (right) showing aberrant white plumage on forecrown and around eyes, Reserva Buenaventura, photos by DJL.

Variable Seedeater - *Sporophila corvina*

On 13 and 17 November 2005, an unusual male *Sporophila* was observed along a two-track road in old pasture and secondary scrub at 300 m a.s.l. at Fundación Jocotoco's Reserva Buenaventura, El Oro province. The plumage pattern of this individual resembled a typical male *Sporophila corvina*, however the white underparts and

rump typical of that species were replaced by bright tawny chestnut (Fig. 6). The individual retained the white wing speculum and also white axillaries, which were viewed when the bird lifted its wings while perched. The thin white eyering typical of some male *S. corvina* was not observed, though if these feathers were tawny-chestnut like the contour feathers, it could be difficult to observe due to low contrast with the black head.



Figure 6. Watercolor of an erythromelanic *Sporophila corvina* by DJL, from field notes and sketches by PAH.

Discussion

To our knowledge, pigment aberrations in plumage are currently undocumented in Ramphastids (Short & Horne 2002) and this *Pteroglossus erythropygius* may be the first documented case. In addition to the plumage aberration, pigmentation also appears disrupted in the bill and orbital skin. The feathers appear pale buff, not bright white, indicating the presence of some pigments in the plumage and therefore, this individual is not leucistic according to Buckley's (1982) definition. Schizochroism, specifically non-eumelanin schizochroism, appears to be a better diagnosis for this bird's plumage condition, though this bird does not appear as dark as other schizochroic fawn variants described by Buckley (1982), which have a richer tawny to warm brown hue.

Leucism has not been reported for *Coragyps atratus* (Buckley 1999), nor other species in the Cathartidae (Houston 1994, Kirk & Mossman 1998), however there are unpublished photos (S. Whitecloud) of a leucistic *Cathartes aura* from Golden Gate Raptor Observatory (<http://www.ggro.org>), which was present in the San Francisco Bay area (mostly in Marin Co.) from 5 September 2002 to 7 March 2003.

Leucistic individuals are well documented in *Catharus* and *Turdus* (Evans-Mack & Yong 2000, Jones & Donovan 1996, Sallabanks & James 1999). Leucistic migrant *Catharus ustulatus* have been captured several times in North America (Evans-Mack & Yong 2000), and *Turdus migratorius* is one of the most commonly observed birds with leucism in North America (Sallabanks & James 1999). Leucism was not reported in *Parula pitiayumi* by Regelski & Moldenhauer (1997).

The *Sporophila corvina* observed at Buenaventura appeared to exhibit erythromelanism, where erythromelanin was deposited in normally white contour feathers. Olson (1966) collected a *Sporophila corvina* in Panama (AMNH) that exhibited similar plumage features to the individual observed at Buenaventura, with chestnut replacing the white contour feathers except the midbelly. Like the individual at Buenaventura, in Olson's specimen the wing speculum and axillaries remained white. Erythromelanism as well as other pigment aberrations may be widespread and important in the evolution of plumage patterns in the *Sporophila/Oryzoborus* clade, as simple replacements of rufous for black or white in the plumage are the only plumage traits that separate several closely related forms, such as *Oryzoborus funereus* and *O. angolensis*, and the 'capuchinos' clade containing the small southern South American species *Sporophila ruficollis*, *S. palustris*,

S. zelichi, and *S. cinnamomea* (Lijtmaer *et al.* 2004, Ridgely & Tudor 1990).

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Table 1. This table summarizes plumage characters affecting complete and partial aberrant plumages, following Buckley (1982) except for erythromelanism, which we expand slightly. Aberrant plumage conditions are arranged from those characterized by extra or excessive pigments above the dotted line, to those characterized by loss or lack of pigments below.

Aberrant Plumage Condition	Plumage characters
Melanism pigments (complete or partial).	Extra or excessive melanin
Erythromelanism melanins or is deposited in feathers normally lacking melanin (complete or partial).	Erythromelanin replaces other
Carotenism pigments (complete or partial).	Extra or excessive carotenoid

Dilution all pigments in entire plumage (complete).	Uniform reduction, but not loss, of
Schizochroism xanthophyl pigments and retention of other pigments in entire plumage (complete).	Loss of particular melanin or
Non-phaeomelanin (complete).	Lack of phaeomelanin; gray variant
Non-eumelanin (complete).	Lack of eumelanin; fawn variant
Leucism (melanins, carotenoids, etc...) in feathers only, resulting in pure white plumage or single feathers (complete or partial).	Lack of a particular or all pigment
Albinism body parts including plumage (complete).	Lack of all pigments in all external