

# Morphological variation in the Black Falcon *Falco subniger*

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**Abstract.** We describe and discuss a field observation of a strongly speckle-breasted and barred Black Falcon *Falco subniger* that also, unusually, had yellow feet and cere and pale-yellow orbital rings. We also found several museum specimens with ‘variegated’ plumage and yellow bare parts. We speculate that yellow bare parts in this species might occur only in some individuals, perhaps mostly males, of the most variegated (pale-marked) plumage types, and that these correlated features may be age-related characters that deserve further investigation. We also discuss the implications for field identification.

## Introduction

The ability to correctly identify a species and its age and breeding status has implications for assessments of its distribution, population status (e.g. densities) and trends. Identification depends on species-specific markers, but for raptors, often seen only in flight at a distance, identification often relies more on the size, shape and flight behaviour (e.g. flapping style, wing carriage in gliding/soaring flight) of the various species (e.g. Debus 2019; Seaton *et al.* 2019). In other situations, accurate identification may depend more on plumage and other morphological markers.

The Black Falcon *Falco subniger* is one of the lesser-known Australian falcons, for which field characteristics and age and sex criteria are insufficiently documented. Historically, it was commonly illustrated with yellow bare parts (e.g. Cayley 1965, and the Gould, Diggles, Mathews and Gostelow plates from the 1800s and early 1900s in Olsen 2015); however, it is unclear on what information this practice was based. The Cayley plate caused some debate about the Falcon’s bare-part colours in the 1960s (G. Czechura pers. comm.).

Most recent field guides and handbooks, starting with the illustration in Frith (1969), have long recognised that some individuals of the normally uniformly dark Black Falcon can have a speckled breast, as well as some other pale features such as the cheeks, throat, barred crissum, and fine barring under the wings and tail. These features are commonly attributed to age and/or gender, characterising such pale birds as old adults or old females (e.g. Pizzey & Knight 1997; Slater *et al.* 2014; Hollands 2021). The only published evidence is that of Marchant & Higgins (1993), who noted that the amount of white in the plumage increases with age up to at least 5 years (citing P. and J. Olsen), and that the various pale plumage features are correlated with one another. The image of a speckle-breasted bird in Frith (1969) is labelled ‘adult male’. It is apparent that some breeding females can be dark-faced and dark-breasted, whereas some breeding males can be pale-faced and barred under the wings and tail (e.g. Whelan *et al.* 2016; Debus *et al.* 2017; Schoeb *et al.* 2019). A few juveniles can also, somewhat atypically, show pale cheeks (Debus *et al.* 2005; Debus & Olsen 2011; Schoeb *et al.* 2019).

The Black Falcon usually has pale grey or pale blue-grey to off-white feet (e.g. Marchant & Higgins 1993). However, Slater (1970, p. 48) illustrated the Black Falcon with yellow bare parts (cere, orbital rings and feet), stating ‘yellow or blue legs’ in the short descriptor (p. 49). He further noted that the cere and orbital rings can be ‘pale yellowish’ and the legs can be ‘dirty yellow’ (p. 252). Conversely, Olsen (1975), Cade (1982), and Marchant & Higgins (1993) differed, the latter stating (p. 305) ‘never yellow’ although conceding that specimens rarely have (in life, from museum labels) a ‘very faint yellowish tinge’ to the feet. Figure 4 of Debus & Olsen (2011) features a speckled and barred adult Black Falcon with straw-coloured feet, assuming that the film processing (noted as ‘correctly exposed’) and print reproduction were true to colour. The Slaters’ later guide (Slater *et al.* 2014) did not mention or illustrate yellow bare parts in the Black Falcon, but did state and illustrate that old adults (>10 years) develop a speckled breast and ‘some very old birds have white bib’ (p. 192). The text in Pizzey & Knight (2012, p. 156) mentions only ‘whitish’ bare parts, and illustrates the Black Falcon with pale straw-coloured feet.

Here we describe and discuss a field observation of an exceptionally speckled individual Black Falcon, which also had yellow feet, from the Darling Downs west of Toowoomba, Queensland. We also discuss museum specimens that have yellow feet.

## Methods

As part of our evaluation of plumage variation and yellow bare parts in the Black Falcon, we contacted the following museums for information on and photographs of any Black Falcon specimens with strongly ‘variegated’ plumage (speckled breast, barred remiges and rectrices) and/or yellow bare parts:

- Australian National Wildlife Collection, CSIRO, Canberra (ANWC)
- Australian Museum, Sydney (AM)
- Museums Victoria, Melbourne (MV) and the H.L.White Collection (HLW)
- South Australian Museum, Adelaide (SAMA)
- Queensland Museum, Brisbane (QM)

## Field observation

CM, M. Atzeni and S. Combes observed the subject Black Falcon on 8 July 2021 during the annual raptor survey (road count) conducted by the Toowoomba Bird Observers. At the Condamine River near Cecil Plains (27°33'S, 151°16'E), ~50 km west of Toowoomba, at 1220 h, the Falcon was perched ~80–100 m away and ~20 m above ground on a dead tree, amid riparian eucalypt woodland traversing agricultural cropping land. This falcon was extensively photographed (by CM and S. Combes) while perched and in flight (Figures 1 and 2). Given that it was observed by CM and M. Atzeni for c. 2–3 minutes through a 20 × 60 Kowa spotting scope, we are satisfied that the colour of the bare parts (Figure 1) is genuinely reported here and not a function of overexposure by the digital camera, or of processing of the images.

This Black Falcon was exceptionally speckled on its entire underparts, having a pale head and prominently pale-banded crissum, yellow feet and cere, and pale-yellow tarsi and orbital rings (Figure 1). In flight it was clearly a Black Falcon on the basis of its observed and photographed shape and flight behaviour (e.g. long, broad and sharply pointed wings, long square-tipped tail with 'stepped' outermost rectrix; flapping action, flat to slightly drooped wings in glide). It was not an aberrant Brown Falcon *F. berigora*, based on the short tarsi, long middle toe, and flight behaviour (no heavy 'overarm' action or dihedral in glide). This bird bore a striking resemblance to a juvenile Laggard Falcon *F. jugger* (see illustration in Ferguson-Lees & Christie 2005), other than the lack of prominent underwing barring (Figure 2). G. Czechura (pers. comm.) observed a similar 'mystery' falcon near Maleny, south-eastern Queensland in c. 1968, now considered to have been a Black Falcon on the basis of the present observation. That is, falcons like the one at Cecil Plains are occasionally observed in the field.



**Figure 1.** Black Falcon perched, Cecil Plains, Queensland, 8 July 2021. Photo: Suzanne Combes

## Museum and other specimens

We located speckle-breasted and barred male Black Falcon specimens with yellow bare parts in the MV and ANWC (Figures 3 and 4). The former collection likely includes the model for Frith's (1969) illustration, which lacks the yellow bare parts evident in at least two of the specimens (MV HLW1194 and B5758). Although the feet of century-old MV HLW1194 are discoloured, a few yellow scales are still evident (Figure 3). Another conspicuous individual with yellow feet, lodged in the ANWC (B44130) in 1991, might have been the model for the "old adult" depicted in Pizzey & Knight (1997 and subsequent editions to 2012). This bird, with attached jesses obscuring its tarsus colour, and donated by Penny Olsen, came from a facility for captive raptors in the Canberra region, but its provenance in the wild is unknown (P. Olsen pers. comm.). It is likely that ANWC B44130 was received too late to be included in the descriptions of the Black Falcon's bare parts in Marchant & Higgins (1993).

We also located two specimens with yellow bare parts in the SAMA (Figure 5). One SAMA specimen (B34016) has conspicuously yellow feet and tarsi, pale-yellow orbital rings and dull-yellow cere, even in the preserved skin. It has a white throat, the beginnings of a speckled upper breast, barred primaries and crissum, and faint tail-bars. The other (B30856) has dull or 'dirty' yellow feet and lower tarsi and dull-yellow orbital rings in the preserved skin. It has an extensive mottled white throat, barred crissum and barred primaries. On measurements, B34016 is male (wing 364 mm, tail 197 mm) and B30856 is female (wing 407 mm, tail 223 mm; cf. Marchant & Higgins 1993). Both birds were collected in the mid 1970s, but were not included in the account of plumages and bare parts in Marchant & Higgins (1993). No age-related information could be derived from any of the above specimens, but the tendency for lighter plumage type, yellow bare parts and male gender to be associated is noteworthy.



**Figure 2.** Black Falcon in flight, Cecil Plains, Queensland, 8 July 2021. Photo: Chris MacColl





**Figure 3.** Male Black Falcon specimen (Museums Victoria: HLW1194) collected from Cobborah, central-western New South Wales in 1913 by T.P. Austin. Photo: Karen Rowe



**Figure 4.** Male Black Falcon specimen (ANWC B44130) lodged in 1991 from a captive facility in Canberra, Australian Capital Territory. Photo: Leo Joseph

The Queensland Museum does not hold any specimens that meet our criteria of strongly ‘variegated’ plumage and/or yellow bare parts. However, the legs and feet of one historical female specimen (QM O.5813, collected in 1957), described on the tag as “grey”, have shrivelled and become discoloured to a ‘dirty’ bone colour.

We note that the museum specimens with yellow bare parts also have a pale-yellow base to the bill (where Marchant & Higgins 1993 stated pale blue-grey) and, where visible in the photographs, yellow gape flanges. Some other specimens, otherwise lacking yellow bare parts, also show a pale base to the bill, tending to cream

or pale yellow. How much of this bill yellowness is related to discoloration of dried tissues in historical specimens is unclear. However, it seems unlikely that preparation and ageing of skins would cause the feet to become obviously yellow (e.g. Figure 5), but might more likely result in loss of colour (e.g. Figure 4), given that some live birds in the wild have yellow feet (Figure 1). For instance, prepared historical (26–50-year-old) skins of yellow-footed adult falcons (a Peregrine Falcon *F. peregrinus* and a Nankeen Kestrel *F. cenchroides*) have darkened and discoloured feet; as does a Brown Falcon skin (24-year-old) that apparently had pale-grey feet; but another Brown Falcon



**Figure 5.** Black Falcon specimens SAMA B34016 (a) and B30856 (b), collected in south-eastern South Australia in 1977 and 1976 at Mulgundawa and Bool Lagoon, respectively. Photos: Maya Penck



**Figure 6.** Light-coloured adult Black Falcon (AM O.71126, lower), originally misidentified as a Brown Falcon, compared with fresh fledgling Black Falcon (AM O.74636, upper; see text). Photo: Leah Tsang



skin (40-year-old) has straw-coloured feet (photographs per L. Tsang). See also Schoenjahn (2010) on colour changes in museum skins. It is unclear what proportion of adult Black Falcons have yellow bare parts, but it is low (<10%).

Although the Australian Museum does not hold any Black Falcon specimens that meet the relevant criteria, we note that one skin (AM O.71126, collected in September 2003) from Tharbogang in inland New South Wales was initially misidentified as a Brown Falcon. This bird is a worn and moulting adult, light in colour (for a Black Falcon) with fine barring under the outer primaries (Figure 6). The recently fledged juvenile in Figure 6 (upper) was a fresh road-kill collected by SJSJ in November 2012; its legs and feet were described at the time as “pale blue-grey” (Debus & Zuccon 2013, p. 9), but have visibly darkened in the prepared skin over 10 years.

The only known-age Black Falcon banded as a nestling, and found fatally road-injured in South Australia as an adult 12 years later (Debus & Olsen 2011), had a recovery report lodged by a bird-bander, establishing the bird as a male (on wing and tail measurements; weight 557 g). However, there are no details of plumage or bare parts of this bird (A. Cook pers. comm.), and the specimen has not been registered into the SAMA (M. Penck pers. comm.).

Published photographs of speckled Black Falcons in the wild are rare. One from south-western Queensland involved kleptoparasitism of a Whistling Kite *Haliastur sphenurus* by a Black Falcon having a speckled upper breast and barred primaries and undertail (Fisher 2021). The Falcon was apparently male, from comparative measurements of the longest primary of each bird in the image (K. Fisher pers. comm.), but the photograph and other unpublished ones of the incident reveal off-white rather than yellow bare parts.

## Discussion

The observation at Cecil Plains shows that some Black Falcons can have strongly ‘variegated’ plumage in the form of pale head markings, extensive ventral speckling, and well-banded crissum, even more so than illustrated in some guides. Further, these same birds may have yellow feet and cere and pale-yellow orbital rings. These features parallel those in the Brown Falcon, in which adult males become white-breasted and develop yellow facial skin (cere and orbital rings) over several years, and adult females lighten on the underparts and develop some yellow in the facial skin (McDonald 2003). A yellowish tinge in the legs and feet of Brown Falcons is occasionally reported (Marchant & Higgins 1993).

The presence of yellow or yellow-tinged bare parts in the Black Falcon raises the prospect of such individuals being misidentified as Brown Falcons, especially if such birds are observed only when perched, given the information in most field guides. The Black Falcon image in Frith (1969) was likely based on one of the male specimens at Museums Victoria collected before 1960, when it was illustrated (as signed by the artist on the relevant plate). Three MV specimens (HLW1194, HLW1197 and B5758) meet these criteria, showing the pale plumage characteristics used to describe old adults in the field guides. Review of the digital photographs indicates that two of these (HLW1194

and B5758) could also be described as having yellow feet and tarsi. In addition to ANWC B44130 and the wild bird observed at Cecil Plains, we suggest that pale plumage and yellow bare parts are correlated, and that this combination of traits is more likely expressed in males than in females. In future studies, it may be worth using a spectrometer to measure and compare the dark plumage areas and bare-part colours of fresh Black Falcon specimens of different ages, plumage types and genders.

The resemblance of the palest and most variegated (speckled, barred) Black Falcons to the juvenile Laggard Falcon (resident/non-migratory in India) is to be expected, in view of the DNA-based evidence. That is, these two species are closest relatives, the Black Falcon pedomorphically retaining juvenile plumage and having colonised Australia less than half a million years ago (Fuchs *et al.* 2015). These two species are part of the hierofalcon group (‘great’ or ‘desert’ falcons).

The presence of yellow bare parts and speckled underparts in a few Black Falcons raises several questions, such as: (1) why these features were not observed or reported in the various detailed studies of breeding Black Falcons (e.g. Debus & Tsang 2011 and Charley *et al.* 2014, as well as those mentioned earlier); (2) whether these features are an age character or individual variation, or both; and (3) whether there is a regional and/or dietary (e.g. carotenoid intake) factor in the occurrence of these features.

We conclude that speckle-breasted Black Falcons having yellow bare parts are rare in museum collections and rarely observed in the field. Such individuals in the field should be critically distinguished from Brown Falcons, and documented in the literature with supporting photographs.

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