Nota Curta / *Short Note*

A case of partial leucism in a Little Owl *Athene noctua* in Catalonia, NE Spain

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An unusually coloured Little Owl found in the Vallès area, Catalonia, had a much lighter appearance than the typical form and lacked black colouration in some of its tissues, thereby suggesting that this was a case of partial leucism. Some feathers were unusual since they had dark rachises and white distal feather barbs, indicating abnormalities at cellular level within the papillae.

Key words: Little Owl, *Athene noctua*, nocturnal raptor, bird colouration, melanin, colour aberration.

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Although colour aberrations in owls appear to be infrequent, they have been documented in several species. Alaja & Mikkola (1997) and Mikkola (2003) provide comprehensive lists of 16 species of owls and their colour variations, with albinism the most extreme case. Seven species on this list occur in Europe: Barn Owl *Tyto alba*, Eurasian Scops Owl *Otus scops*, Great Grey Owl *Strix nebulosa*, Tawny Owl *Strix aluco*, Little Owl *Athene noctua*, Northern Hawk Owl *Surnia ulula* and Short-eared Owl *Asio flammeus*. Other records of owls with colour aberrations have been documented from places such as South America: an albino Magellanic Horned Owl *Bubo magellanicus* in Tierra del Fuego (Kusch & Donoso 2017), a leucistic Austral Pigmy Owl *Glaucidium nana* in Argentina (Comisso 2012), a leucistic Burrowing Owl *Athene cunicularia* in Brazil (Nogueira & Alves 2011, Motta *et al.* 2010), and a partially leucistic American Barn Owl *Tyto furcata* in Argentina (Chiale & Pagano 2014).

A ringing program of the Saw-whet Owl *Aegolius acadicus* offers a numerical example for that species that is illustrative of the rarity of this phenomenon: of the 30,000 owls ringed at over a hundred stations in the USA and Canada in 2007–2012, researchers registered just nine cases of aberrant plumage, eight of pastel dilution and one of leucism (Weidensaul *et al.* 2015).

The Little Owl's colouration can be referred to as cryptic, and consists of earthy tones distributed in a pattern of spots and streaks only disrupted by bright yellow eyes. König & Weick (2008) described the Little Owl as "dark to paler greyish-brown above, rather densely spotted whitish to pale ochre below, and streaked dark or lighter brown". Van Nieuwenhuyse *et al.* (2008) provide a detailed account of the colouration of the body and flight and tail feathers. In this article we describe and discuss a record of an unusually coloured Little Owl, which was much lighter in appearance than the typical form.

Case study

In summer 2018, a nestling of a Little Owl *Athene noctua* was brought to the Torreferrussa

Wildlife Rehabilitation Centre (Barcelona Province) after being found in Lliçà d'Amunt (Vallès Oriental, Catalonia, NE Spain; 41° 36' 44"N, 2° 14' 46"E). It had good body condition, and was ringed with a numbered metal ring (M19459 ARANZADI SAN SEBASTIAN) and then released in the Plana de Vic (41° 52' 37"N, 2° 16' 15"E) in June 2019. In autumn 2018, this owl's moulted greater coverts contrasted with its retained primary coverts, which were reminiscent of a second-year bird (spring in Figure 4.12 in van Nieuwenhuyse *et al.* 2008). The owl's general feather colouration was lighter than is typical for this species (Figures 1 and 2), and also lacked the black colouration of tissues such as talons, cere, nostrils and eyelids (Figures 1 and 2). The feathers on its belly, lower chest, facial disk and supercilium were predominantly white, the latter being larger than usual for this species. The white mark on the nape – or occipital face – was more obvious than on a typical Little Owl. The round cream-buff spots on the lesser and secondary coverts were absent and white streaks were present on the outer edges of these feathers. The barring and spotting were less clear than normal and so its plumage appeared more uniform in colour with fewer contrasts than is typical.

Discussion

Based on the key to identifying mutations in colouration in birds proposed by van Grouw (2013), this owl can be described as leucistic since it had a combination of white and normal-coloured feathers, plus a pink bill and feet. However, in this individual the white flight feathers were absent, although many body feathers were completely white and it's lesser and secondary coverts also had white outer vanes, which suggests leucism. Davis (2007) has proposed a more exact nomenclature to characterize

Figure 1. Note the generally lighter than usual colouration of the underwing and underparts and the lack of black colouration on the cere, nostrils and eyelids (October 2018). Photo: Jordi Baucells.
Observeu la coloració més blanca de les infracobertores alars i parts inferiors del que és habitual per a l'espècie i la manca de coloració negra a la cera, narius i parpelles (octubre 2018).

colour abnormalities in birds and this Little Owl fits his definition of 'partial amelanism' defined as "the absence of all melanin from parts of the plumage, skin, eyes or all three areas".

Colour in owls is due to pigmentation rather than the structural characteristics of the feathers themselves (Hudon 2005). The pigments involved in colour variation include melanins, carotenoids, psittacofulvins, porphyrins and a few unknown pigments (Hudon 2005). Of the pigments found in bird feathers, skin, bill and eyes, melanins are the most abundant, although porphyrins cause the brown coloration in owls (Roulin 2016). Melanin pigmentation includes two compounds: eumelanins give black, grey and dark brown colours, and a combination of eumelanins and pheomelanins are necessary for greyish-brown tones. Melanocytes are the specialized cells involved in the production of melanins, which contain the amino acid tyrosine controlled by the enzyme tyrosinase. Any mutation of this enzyme or changes in cell conditions can alter the production of these melanins, resulting in partial or total colour variations, of which leucism is one (van Grouw 2006, 2013). Porphyrins, derived from levulinic acid, determine pigmentation in owls, (Order Strigiformes), nightjars (Order Caprimulgiformes) and bustards (Order Otidiformes) (Galván *et al.* 2018) and porphyrin levels can be affected by genetic and environmental factors (Galván *et al.* 2018, 2019). This Little Owl seems to fall into this category of mutations.

What was unusual about this owl's plumage were the white outer stripes on otherwise normally coloured coverts that contrasted with the pure white feathers on the lower chest. Most examples of leucism show pure white feathers rather than a mix of dark and white on the same feathers. The definition of leucism is " … All white feathers mixed with normal-coloured ones" (van Grouw 2013). Some of the affected feathers in the studied owl are not completely white as their rachises are dark and distal barbs white. The development of feathers from the dermal papilla into the epidermal collar starts with the distal feather barbs that then merge with the central rachis ridge (Prum & Brush 2002, Bostwick 2016). Thus, in the whiter covert feathers on this owl, the white portion developed first with melanin being added later during the growth of the rachises from the same papilla.

Figure 2. Note the general light colouration and the lack of black on the talons (October 2018). Photo: Jordi Baucells.
S'observa la coloració general clara i la manca de coloració negra a les urpes (octubre 2018).

This pattern indicates that the cells in the papilla that deposited the barbs were missing melanin, while the cells in the same papilla that deposited the rachises did contain melanin. The causes behind these differences in the microstructure of these feathers could be due to intrinsic (e.g. a genetic alteration or parasitic infection) or extrinsic (e.g. environmental conditions or diet) factors (Sage 1962, Côte *et al.* 2018, Galván *et al.* 2018, van Grouw 2018). Davis & Blumin (2012) describe the case of a Mew Gull *Larus canus* with four types of pigment variation that remained consistent over a period of 10 years.

Another cause for the absence of pigment in feathers is 'progressive greying', which refers to the increase in the number of whiter feathers after each moult (van Grouw 2013). Since this Little Owl was a first-year bird, progressive greying is a less likely explanation of its colouration than leucism.

A few records of anomalies or aberrations in Little Owls are mentioned briefly in the monograph by van Nieuwenhuyse *et al.* (2008). These

authors provide only one example of leucism – from the Brinzal Owl Rehabilitation Centre (Madrid, Spain) – but give no further details and so we are unable to compare it with our findings. Little Owls with completely white plumage but normal coloured eyes have occurred in a population in Jerez, S Spain (Alaja & Mikkola 1997).

Certain physiological and behavioural advantages are associated with the role of melanin in the plumage, including camouflage, thermoregulation, protection against UV radiation, pathogens and behaviour (Roulin 2014, Côte *et al.* 2018). A loss of dark pigments might affect the individual involved and lead to easier detection by predators or changes in success in mate choice. However, Bensch *et al.* (2000) and Ajala & Mikkola (1997) found no differences in life expectancy or breeding success in Great Reed Warblers *Acrocephalus arundinaceus* and certain Strigiformes, respectively. It is impossible to say whether or not this partially leucistic Little Owl was hindered by its anomalous plumage and we can merely infer some disadvantages. Like the Little Owl, the Northern Pygmy-Owl *Glaucidium gnoma*, has false eyes. It has been experimentally shown how mobbing avian behaviour around Northern Pygmy-Owls changes if the occipital face traits (or eyespots) are altered (Deppe *et al.* 2003). The plumage variation in this studied owl had less well-defined eyespots than typical owls and so it may have benefitted less from this colour trait than other Little Owls.

Gloger's rule predicts that darker-coloured animals should be found in warm humid regions, while lighter-coloured individuals should occur in cold and drier climates. Although this is only a general rule based on the advantages afforded by darker plumage (i.e. more cryptic plumage helps hide from predators and improves thermoregulation), it has been shown for other owl species, nonetheless, that melanin-based coloration can also work as an adaptive mechanism; this is the case of adaptations in the Barn Owl (Roulin & Randin 2015), Tawny Owl (Emaresi *et al.* 2011, Karell *et al.* 2011) and Scops Owl (Galeotti *et al.* 2009) due to changes in climatic conditions.

These three owl species are clearly polymorphic and typically exhibit colour variations. Colour variation, as has been explained, is not a random trait and phenotypical variation seems to underlie important trades-offs. Leucism, on the other hand, is very different and is a malfunction of the melanin process that gives rise to unusually coloured individuals, which may experience certain advantages or disadvantages when compared to Little Owls with standard colouration.

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Resum

Un cas de leucisme parcial en mussol comú *Athene noctua* a Catalunya

Es va trobar un mussol comú amb una coloració diferent de la normal a la comarca del Vallès Oriental. Mostrava una aparença molt més blanquinosa que la típica per a l'espècie i li faltava la coloració negra en alguns teixits. Això en feia un cas de leucisme parcial. Algunes plomes presentaven, inusualment, el raquis fosc i unes bàrbules distals blanques que indicaven anormalitats cel·lulars de les papil·les.

Resumen

Un caso de leucismo parcial en mochuelo europeo *Athene noctua* en Cataluña

Se encontró un mochuelo europeo de coloración poco habitual en la comarca del Vallès Oriental. Mostraba una apariencia mucho más blanquecina que la típica de la especie y le faltaba la coloración negra en algunos tejidos. Ello lo convertía en un caso de leucismo parcial. Algunas de las plumas presentaban, inusualmente, el raquis oscuro y unas bárbulas distales blancas que indicaban anomalías celulares de las papilas.

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