

## Short Communication

# Chromatic aberrations in Eurasian Coot (*Fulica atra*): new record and a review from Italy suggest a cautious approach in diagnoses

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**Abstract** - We report a case of chromatic aberration (progressive greying) of a Eurasian Coot (*Fulica atra*) from a drainage canal neighbouring a recently restored wetland from Latium, central Italy (third case for this rail at the regional level). Moreover, we reviewed the cases of chromatic aberrations (leucism, progressive greying, albinism, etc.) in this species for Italy (1990-2024), obtaining records for 13 sites. However, the complete albinos mentioned in the literature are very questionable since many different conditions should be met for a correct diagnosis of this aberration. We suggest that, when genetic data are lacking, repeated behavioural observations should be conducted on focal animals recorded at different times, therefore carrying out a correct diagnosis about the type of chromatic aberration characterizing these birds.

**Key words:** leucism, progressive greying, albinism, rails.

**Riassunto** - Aberrazioni cromatiche nella Folaga eurasiatica (*Fulica atra*): una nuova osservazione e una revisione dall'Italia suggeriscono un approccio cauto nella diagnosi.

Si riporta un caso di aberrazione cromatica (ingrignimento progressivo) di una Folaga (*Fulica atra*) osservata in un canale di bonifica adiacente a una zona umida creata recentemente (nell'ambito di un progetto di riqualificazione ecologica) nel Lazio, Italia centrale. È il terzo caso per questo rallide a livello regionale. Con l'occasione, abbiamo esaminato i casi di aberrazioni cromatiche (leucismo, progressivo ingrignimento, albinismo, ecc.) relativi a questa specie per l'Italia (1990-2024; n=13). I casi di albinismo completo menzionati in letteratura sono dubbi poiché devono essere soddisfatte molte condizioni diverse per una dia-

gnosi corretta di questa aberrazione. Sugeriamo che, in mancanza di dati genetici, si debbano condurre osservazioni comportamentali ripetute su animali focali registrati in tempi diversi, allo scopo di effettuare una diagnosi corretta sul tipo di aberrazione cromatica che caratterizza questi uccelli.

**Parole chiave:** leucismo, progressivo ingrignimento, albinismo, rallidi.

Morphological anomalies are of great interest in natural sciences (Sokos *et al.*, 2018) and, among these, chromatic aberrations in bird plumage represent a research sector investigated for over a century (Frauenfeld, 1853; for Italy: Picchi, 1903; review in van Grouw, 2006). Apparently, such anomalies can be of environmental or genetic origin, in the latter case linked to mutations which, in turn, can be triggered by environmental circumstances (e.g., isolation in small populations, pollutants, and other circumstances; Sokos *et al.*, 2018). In some cases, the aberrations can be caused by diseases, injuries, or anomalies in eating habits (Guay *et al.*, 2012; Koparde *et al.*, 2014).

Chromatic aberrations have been differentiated into many types depending on the chemical, physiological, genetic, and environmental processes that are at the origin of the phenotypic patterns. Some authors have proposed methods for their correct identification and classification (e.g., Rodríguez-Ruiz *et al.*, 2017). Specifically, van Grouw (2021) distinguished among leucism (congenital absence of melanin-producing cells), progressive greying (progressive loss of melanin-producing cells), albino (total absence of melanin due to lack of the key enzyme), brown (incompletely coloured melanin), ino (even less completely coloured melanin), dilution (altered deposition of melanin) and melanism (altered distribution of melanin).

Leucism and progressive greying (or progressive depigmentation) are two colour aberrations in which melanin production is partly blocked, thus causing the presence of white feathers in birds (van Grouw, 2013). More particularly, leucism and progressive greying are frequently confused aberrations and are usually difficult to separate in the field. Leucism (partial or total) 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 (van Grouw, 2013).

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Leucism often generates a patchy and bilaterally symmetrical pattern of white feathers, usually in the wings, belly, and head. In contrast, progressive greying results in the gradual loss of pigment-producing cells with age; white feathers during the early stages of progressive greying are randomly distributed, mainly on the head, back, and flanks (van Grouw, 2013, 2014). 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. This aberration may be caused by genetic disorders causing the loss of pigment cells or by external non-heritable factors (diseases, food deficiency: van Grouw, 2013). In both leucism and progressive greying, the eyes retain their colour differently from albinism (van Grouw, 2013).

In April 2023, in a drainage canal near the Ufente River (Pontinia, province of Latina; central Italy; 41°26'55.2"N, 13°06'59.2"E), we repeatedly observed a Eurasian Coot (*Fulica atra*) with a chromatic aberration in the presence of conspecific individuals with normal colouration (Fig. 1). The individual showed eyes retain their colour and has still lots of pigmented feathers too. Therefore, we excluded the albinism. Moreover, the individual observed is an adult: albinos do not survive long (and will die as chicks) simply because of their very poor eyesight (and not only because they are white). However, without knowing the bird's history and without having available the specimen, it is often impossible to determine the true nature of the type of this chromatic aberration, probably referable to progressive greying, certainly the most common cause of white feathers in wild birds, when compared to leucism (van Grouw, 2013).

From Italy, evidence for chromatic aberrations (albinism, leucism, progressive greying) is largely available (charadriiformes: e.g., *Chroicocephalus ridibundus*; podicipediformes: *Podiceps cristatus*, *P. nigricollis*; anseriformes: *Aix galericulata* (introduced), *Anas platyrhynchos*; suliformes: *Phalacrocorax carbo sinensis*; accipitriformes: *Gyps fulvus*, *Circus aeruginosus*; columbiformes: *Streptopelia decaocto*, *Columba palumbus*, *Columba livia* f. do-

mestica; passeriformes: *Sylvia borin*, *Pica pica*, *Corvus cornix*, *Garrulus glandarius*, *Hirundo rustica*, *Sturnus vulgaris*, *Turdus merula*, *Emberiza schoeniclus*) (Micheli & Busetto, 1991; Fraticelli, 2000; Miraglia *et al.*, 2003; Sassi, 2005; Troccoli, 2005; Associazione Faunisti Veneti, 2010; Casale *et al.*, 2017; Sighele *et al.*, 2020; 2021; Laurenti & Paci, 2023; Laurenti, pers. comm.).

Among gruiformes, Colli & Giovacchini (2016) in Tuscany, Cento *et al.* (2020) in Latium, and Laurenti (pers. comm.) in Umbria provided evidence for *Grus grus*. However, reviewing records for Eurasian Coot (gruiformes, rallidae) we obtained evidence of chromatic aberrations for 13 sites (Tab. 1). Particularly, in Latium (central Italy), other cases of plumage anomalies in the Coot were recorded in Nazzano (Rome) in the 1970s (completely albino individual with red eyes; Fraticelli, Vigna Taglianti vidit) and near the Circeo lakes (Ferrari, vidit), the latter attributable to leucism or progressive greying (Tab. 1).

In rails, chromatic aberrations (albinism, leucism, progressive greying) causing the presence of white feathers have been reported for some species: *Fulica gigantea* (Perù: Alarcón Pardo, 2020; Argentina: Urcola, 2011; Chile: Fuentes & Gonzales-Acuna, 2011), *F. americana* (USA: Ross, 1963; Diakuw, 2015; Mexico: Rodríguez-Casanova & Zuria, 2017; Gómez-Garduño *et al.*, 2020), *F. ardesiaca* (Ecuador: Henry, 2005; Mena Valenzuela & Mena Gonzales, 2016; Mena Valenzuela, 2017), *F. armillata* (Argentina: Urcola, 2011; Chile: Fuentes & Gonzales-Acuna, 2011; for a review, see, e.g., Rodríguez-Ferraro *et al.*, 2015; see also for undetermined *Fulica* sp.: India: Parasharya *et al.*, 1996).

Among Eurasian rails, progressive greying and leucism have been recorded for Eurasian Coot (e.g., Sage, 1962; Volf, 2000; van Grouw, 2006; van Grouw & Hume, 2016; Patel *et al.*, 2022), and in Common Moorhen (*Gallinula chloropus*) (Rodríguez-Ferraro *et al.*, 2015; van Grouw, 2021).

However, as yet reported, the complete albinos mentioned in the literature are very questionable since many different conditions should be met for a correct diagnosis of albinism (H. van Grouw, pers. comm.; Mahabal *et al.*,



Fig. 1 – Coot individual characterized by chromatic aberration (progressive greying). On the right, together with a specimen showing normal plumage (drainage canal near Ufente river, Municipality of Pontinia, province of Latina; central Italy; April 2023). / Individuo di folaga caratterizzato da aberrazione cromatica (ingrigimento progressivo). A destra, assieme ad un altro esemplare con piumaggio normale (canale di bonifica nei pressi del fiume Ufente, comune di Pontinia, provincia di Latina; Italia centrale; aprile 2023).

Tab. 1 – Records of chromatic aberrations (albinism, leucism, progressive greying; excluding melanism) for Eurasian Coot (*Fulica atra*) in Italy. Type of chromatic aberration (declared), site and source (web link or reference) have been reported. / Segnalazioni di aberrazioni cromatiche (albinismo, leucismo, ingrimento progressivo) per la Folaga eurasiatica (*Fulica atra*) in Italia. Sono stati segnalati il tipo di aberrazione cromatica (dichiarata), il sito e la fonte (link web o riferimento).

Chromatic aberration (as declared)	Site	Source
Albinism	Nazzano (Latium)	F. Fraticelli, A. Vigna-Taglianti, pers. obs. (1970s)
Leucism	Salso lake - Manfredonia (Foggia, Apulia)	Anonymous (1)
Leucism	Posta Fibreno lake (Rieti, Latium)	A. Scalia, pers. obs. (2)
Leucism	Quarries - Castelletto di Branduzzo e di Casatisma (Pavia, Lombardy)	Ferlini & Ferlini (1998)
Albinism	“Le folaghe” Park, Casei Gerola (Pavia, Lombardy)	Anonymous (3)
Leucism/albinism	Alviano Lake (Terni, Umbria)	S. Laurenti, pers. obs. (2008): two individuals (20 December and 15 March); see also Anonymous (4)
Leucism	S. Felice del Benaco harbour (Brescia, Lombardy)	Gargioni & Guerrini (2009)
Leucism	Dascio (Como, Lombardy)	M. Bianca, pers. obs. (5)
Progressive greying (‘leucism’ declared)	undetermined	P. Cusufai, pers. obs. (6)
Partial albinism	San Liberato (Terni, Umbria)	S. Laurenti, pers. obs. (2016)
Progressive greying	Imbersago (Lecco, Lombardy)	Anonymous (7)
Leucism or progressive greying	Circeo National Park (Latium)	E. Ferrari, pers. obs.
Progressive greying	Drainage canal near Ufente river, Latina (Latium)	This note

(1) <http://web.tiscalinet.it/ebnitalia2/QB003/aberrazioni.htm>; (2) [http://www.centimetridinatura.it/2016\\_GALLERIE/GRUI-FORMES\\_1/album/index.html](http://www.centimetridinatura.it/2016_GALLERIE/GRUI-FORMES_1/album/index.html); (3) <http://www.parcolefolaghe.it/scheda.asp?cntId=17>; (4) [https://www.naturamediterraneo.com/forum/topic.asp?TOPIC\\_ID=74996](https://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=74996); (5) <https://matteo-bianca.blogspot.com/2012/10/folaga-parzialmente-leucistica.html>; (6) <https://www.juzaphoto.com/galleria.php?t=2275050&l=it>; (7) [https://www.naturamediterraneo.com/forum/topic.asp?whichpage=1&TOPIC\\_ID=328798&](https://www.naturamediterraneo.com/forum/topic.asp?whichpage=1&TOPIC_ID=328798&)

2016). Therefore, when genetic data are lacking, repeated behavioural observations should be conducted on focal animals because these may provide important evidence regarding the survival and reproductive success of individuals showing chromatic aberrations, these last decreasing longevity (for increased rates of predation and intraspecific aggression; Holt *et al.*, 1995). Moreover, birds with progressive greying exhibit only a few white feathers in the early stages, but white feathers increase after every moult cycle, and the whole plumage can become white (van Grouw, 2013); therefore, studies on focal individuals recorded at different times could suggest the type of chromatic aberration characterizing these birds.

This is a preliminary and explorative note at the single-species level. Many records of chromatic aberrations in birds are dispersed in an extensive grey literature; therefore, we stimulate further reviews analysing this interesting and complex phenomenon, also focusing on other species and groups and using different approaches (e.g., both bibliographic and social-media reviews).

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