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# Reporting of partial leucism in *Argya malcolmi* (Passeriformes: Leiothrichidae) from Haryana, India: implications for plumage aberration studies

## Informe de leucismo parcial en *Argya malcolmi* (Passeriformes: Leiothrichidae) de Haryana, India: implicaciones para los estudios de aberración del plumaje

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## Abstract

Leucism is a sporadic plumage aberration caused by genetic mutations that disrupt melanin deposition and pigment cell migration. For avian ecology and evolutionary processes, it has significant implications. Present study reveals the first photographic documentation of a partial leucistic Large Grey Babbler in association with group of Jungle Babbler from Mangar-Bani Forest, Aravalli landscape, Haryana, India during a field survey in October 2023. The individual with white plumage and pale cream coloured spot on its feathers, while the eyes, beak, and tarsi, retained distinctive pigmentation, differentiating the condition from albinism. As per State of India's Birds and IUCN Red List data, the species of Large Grey Babbler is classified as Least Concern, although moderate declining population trend are reported in India. Behavioural observations signify normal social integration and activity patterns with no evidence of social exclusion or risk of natural predation. This photographic record adds limited but important growing evidence on avian leucism and is consistent with recent global findings on the prevalence and ecological consequences of plumage abnormality. The study highlights the importance of systematic field documentation for understanding

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of genetic basis and evolutionary significance of such rare phenotypes. The presence of bird with partial leucism in such fragmented habitats as Mangar-Bani emphasizes the importance of conservation of such landscapes. To further study the factors and consequences of leucism in wild bird populations, it is recommended to continue monitoring and implementation of genetic approaches.

**Keywords:** Aravalli, Avian genetics, Conservation, Albinism, Abnormal appearance.

## Resumen

El leucismo es una aberración esporádica del plumaje causada por mutaciones genéticas que interrumpen la deposición de melanina y la migración de células pigmentarias. Para la ecología aviar y los procesos evolutivos, tiene implicaciones significativas. El presente estudio revela la primera documentación fotográfica de un charlatán gris grande parcialmente leucístico en asociación con un grupo de charlatanes de la jungla del bosque Mangar-Bani, paisaje de Aravalli, Haryana, India, durante un estudio de campo en octubre de 2023. El individuo con plumaje blanco y mancha de color crema pálido en sus plumas, mientras que los ojos, el pico y los tarsos conservaron una pigmentación distintiva, diferenciando la condición del albinismo. Según los datos de State of India's Birds y la Lista Roja de la UICN, la especie de charlatán gris grande está clasificada como de Preocupación Menor, aunque se informa una tendencia moderada a la disminución de la población en India. Las observaciones de comportamiento significan una integración social normal y patrones de actividad sin evidencia de exclusión social o riesgo de depredación natural. Este registro fotográfico aporta evidencia limitada, pero importante, y cada vez mayor, sobre el leucismo aviar y concuerda con hallazgos globales recientes sobre la prevalencia y las consecuencias ecológicas de las anomalías del plumaje. El estudio destaca la importancia de la documentación sistemática de campo para comprender la base genética y la importancia evolutiva de estos fenotipos raros. La presencia de aves con leucismo parcial en hábitats tan fragmentados como Mangar-Bani enfatiza la importancia de la conservación de estos paisajes. Para profundizar en el estudio de los factores y las consecuencias del leucismo en las poblaciones de aves silvestres, se recomienda continuar el monitoreo y la implementación de enfoques genéticos.

**Palabras clave:** Aravalli, genética aviar, conservación, albinismo, apariencia anormal.

## INTRODUCTION

Forest of Mangar-Bani is located within the Aravalli Range near Faridabad in Haryana. It serves as an important ecosystem, supporting complex ecological interactions and performing important functions like other such forest as the regulation of fire, pollination, resistance to windstorms, carbon sequestration, pest control for both native and invasive insects, and also provides nectar and seeds to maintain bird populations (Barnes et al., 1980). Birds belong to the most diverse taxon of vertebrate and play a fundamental role in the normal functioning of ecosystems. They act as pollinators, scavengers, seed dispersers, and pest regulators, thereby fulfilling most importantly ecological services across biomes (Chopra et al., 2017; Rai et al., 2017; Rai & Vanita, 2022; Rani et al., 2023; Yadav & Rai, 2024; Goyal et al., 2025). The diversity of bird life also makes them reliable indicators of environmental health, as population declines or shifts in distribution often reflect wider ecosystem stresses, such as climate change, urbanization, and intensification of rural economy (Rai & Vanita, 2023; Rai & Yadav, 2023; Yadav et al., 2025). Family Leiothrichidae which includes various babblers, comprise of passerine birds found throughout globe. These babblers are known for their gregarious nature, cooperative breeding biology, and complex vocalizations (Cai et al., 2018). India is home to six species of babblers, namely, *Turdoides striata, Argya malcolmi, Argya earlei, Argya caudata, Turdoides affinis, and Argya subrufa* (Ali & Ripley, 1995). Large Grey Babbler and Jungle Babbler are conspicuous social avian species inhabiting scrublands, agricultural landscapes, dry forests, and urban green spaces (Grimmett et al., 2019).

Colour of plumage plays importantly in the survival and reproductive strategies of aves with objectives of sexual selection, influences camouflage, temperature control, and communication signals (McGraw et al., 2003; Grouw, 2021). Leucism with partial or complete lack of pigments in plumage while retaining normal eye, beak, and foot color, is a rare and fascinating phenomenon in Aves (Grouw, 2021) with unique glimpses of the genetic and ecological processes in birds. Aberrations in feather colour can be caused by genetic mutations or/and their inheritance, nutritional imbalances, environmental factors, or genetic disease (Buckley, 1969; McGraw et al., 2003). Recent advances in genetics studies reveal the various mechanisms behind the leucism, including mutations that disrupt pigment cell differentiation or their migration in plumage tissues. Although these variations can arise spontaneously, but factors like environmental stress, fragmentation of habitats and inbreeding may be possible factors to these plumage anomalies, especially in urban or isolated populations in forest patches (Sinha & Gupta, 2023). Leucism and albinism are of particular interest in plumage aberrations, although they are often confused and mislead in popular and scientific literatures (Grouw, 2021).

Albinism represents the complete lack of melanin, frequently caused by tyrosinase deficiency results in entirely white plumage, pink or red eyes, and de-pigmented bills and legs, thereby affecting both survivorship and vision (Sage, 1962). Leucism or partial leucism is characterized by defects in pigment cell migration or deposition, with partial or complete melanin absence in feathers while unaffected eyes and soft parts. However, it remains underreported in South Asian and Indian ornithological studies. The fitness consequences of leucism are still debated with heightened predation risk and reduced mate attraction, whereas some suggest that in highly social or flocking species, such leucistic individuals may integrate successfully with normal behaviors (Sinha & Gupta, 2023). Most reports of Indian sightings are based on circumstantial, lacking photographic or genetic data (Sinha & Gupta, 2023). There is a clear need for systematic discussion and reporting of such cases to enhance our understanding of avian genetics and their influences on the effects of environmental change on bird populations. On a global scale, the frequency of leucism in birds usually fluctuates from 0.2% to 1.5%, but local studies have revealed higher prevalence in habitats affected by anthropogenic interference or genetic barriers (Grouw, 2021). In India, systematic documentation of leucism in wild birds remains limited, and most of the existing available reports are based on episodic observations or individual thematic investigations (Sinha & Gupta, 2023).

The Large Grey Babbler is a widespread and socially complex species found throughout the Indian Sub-continent; however reports of leucism are extremely rare in this species. The present study represents the first photographic reporting of partial leucism in Large Grey Babbler from Mangar-Bani Forest Haryana, India. As per SoIB (2023) report, the Large Grey Babbler is distributed in the Indian sub-continent (Grimmett et al., 2019), and its, habitat is almost restricted and confined with resident status (Fig. 1, Table 1). Its confined global range highlights the importance of monitoring and conservation for a long-term perspective of this species. The year-round distribution of this species across India, spanning nearly 13,21,070 sq. Km and in Haryana approximately 44,212 sq. Km (Table 1).

In Haryana it is distributed throughout every district and is predominantly observed in different protected areas like Kalesar National Park (Yamunanagar), Bhindawas Bird Sanctuary (Jhajjar), Chhilchilla Wildlife Sanctuary (Kurukshetra), Sultanpur National Park (Gurugram) and in Mangar Bani Forest (Faridabad Aravalli, Haryana). The species is widespread in scrublands, agro-ecosystems, and degraded forest habitats. This broad but fragmented distribution underlines its adaptability, but also its vulnerability to rapid land-use changes (Fig. 1). According to IUCN Red list data, it falls under the Least Concern category with a Stable IUCN population trend globally. The IUCN status of the species over time (1988-2016) is presented in the Table 2.

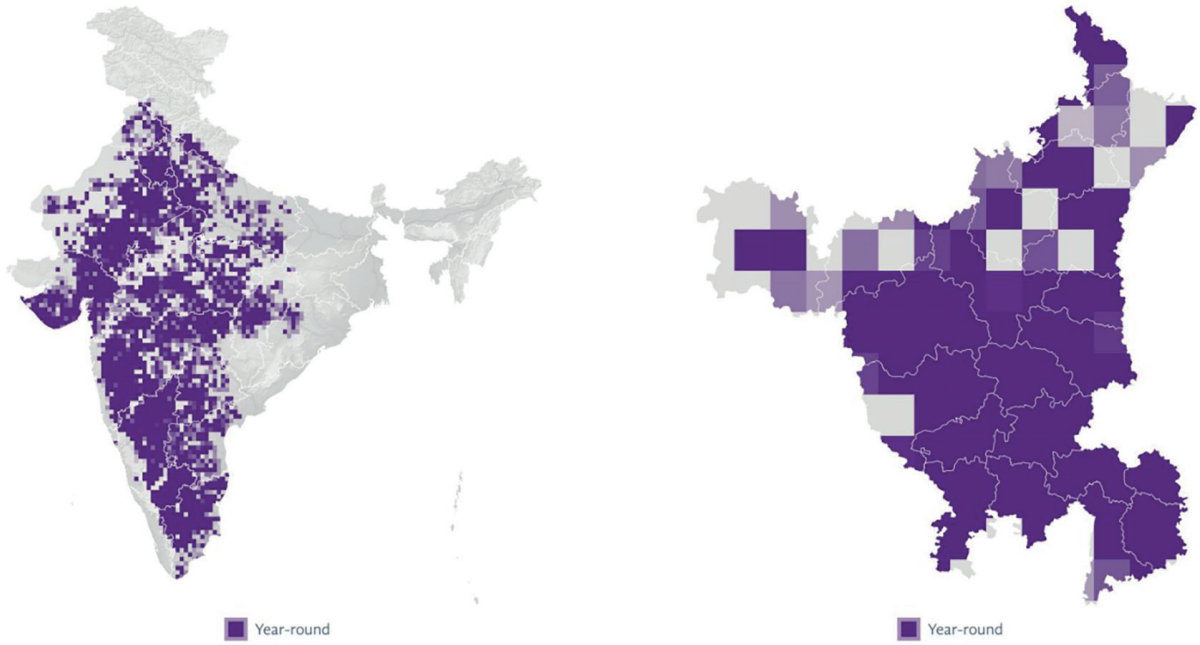


**Figure 1.** Map showing the year-round geographical distribution of Large Grey Babbler in India and Haryana. Reproduced from: State of India's Bird.

**Table 1.** Distribution Trend of Large Grey Babbler (SoIB, 2023).

**Tabla 1.** Tendencia de distribución del Charlatán gris grande (SoIB, 2023).

| Distribution Trend | India | Protected Area | Haryana |
|---|---|---|---|
| Long-term Trend (%) | 16.39 | 16.75 | - |
| Long-term Trend CI (%) | 27.34, 5.32 | 32.94, 5.05 | - |
| Current Annual Trend (%) | 0.13 | 1.59 | - |
| Current Annual Trend CI (%) | 1.49, 1.22 | 3.65, 0.46 | - |
| Distribution Range Size (sq. Km) | 13,21,070 | 13,21,067 | 44,212 |
| Distribution Range Size CI (sq. Km) | 1320620-1321520 | 1320613-1321521 | 44,212 |

**Table 2.** Red list history of assessment of Large Grey Babbler.

**Tabla 2.** Historial de la evaluación del Charlatán gris grande en la lista roja.

| Year | Category |
|---|---|
| 1998 | Lower Risk/Least Concern |
| 1994 | Lower Risk/Least Concern |
| 2000 | Lower Risk/Least Concern |
| 2004 | Least Concern |
| 2008 | Least Concern |
| 2009 | Least Concern |
| 2012 | Least Concern |
| 2016 | Least Concern |

## MATERIALS AND METHODS

### Study Area

The Aravalli Range is well-known for its diverse biodiversity. Starting from Gujarat and Rajasthan in the South-West, it is extended to Haryana and Delhi in the North-East covering the Gurgaon, Mewat, Faridabad, and Rewari districts of Haryana state. Mangar-Bani Forest (28°22'58"N 77°10'19"E), is part of the Aravalli hills in Faridabad, Haryana (Fig. 2). Climate of Faridabad is diverse and include all the five seasons i.e. spring, summer, monsoon, autumn and winter. Average annual temperature of district is about 23.9 with extreme temperature value as 45° C in summer and 2° C in winter. Annual Precipitation is about 700-800 mm which is not equally distributed throughout the district but gradually decrease from North-East to South-West region. Due to diverse climate and wide temperature range, Faridabad serves as a suitable habitat for many bird species. It is a semi-arid tropical dry deciduous forest protected by local traditions as a sacred grove. The vegetation is dominated by *Anogeissus pendula*, *Butea monosperma*, *and Prosopis cineraria* along with dry scrub, and provides habitat for species such as Indian Peafowl, Indian Grey Hornbill, Jungle Babbler, Indian Paradise Flycatcher, Indian Pitta, and Large Grey Babbler. Haryana is recognized for its high avian diversity and supports resident as well as migratory species throughout the year (Yadav et al., 2025).

## METHODOLOGY

An opportunistic sighting of leucistic Large Grey babbler was observed in the month of October 2023, during the field surveys that were conducted from October 2023 to September 2025 with the aim of assessing diversity, population trends, and conservation status of the avian fauna in Mangar-Bani Forest, using scan sampling (Altmann, 1974) and point-cum-line transect method (Sutherland et al., 2005). Observations were aided by field binoculars and photographs were taken using Nikon Coolpix P900 camera for confirmation of record. Distribution and conservation data for *A. malcolmi* were obtained from the State of India's Birds (SoIB, 2023) database and IUCN Red List (2025) to assess diversity, population change trends and conservation status.

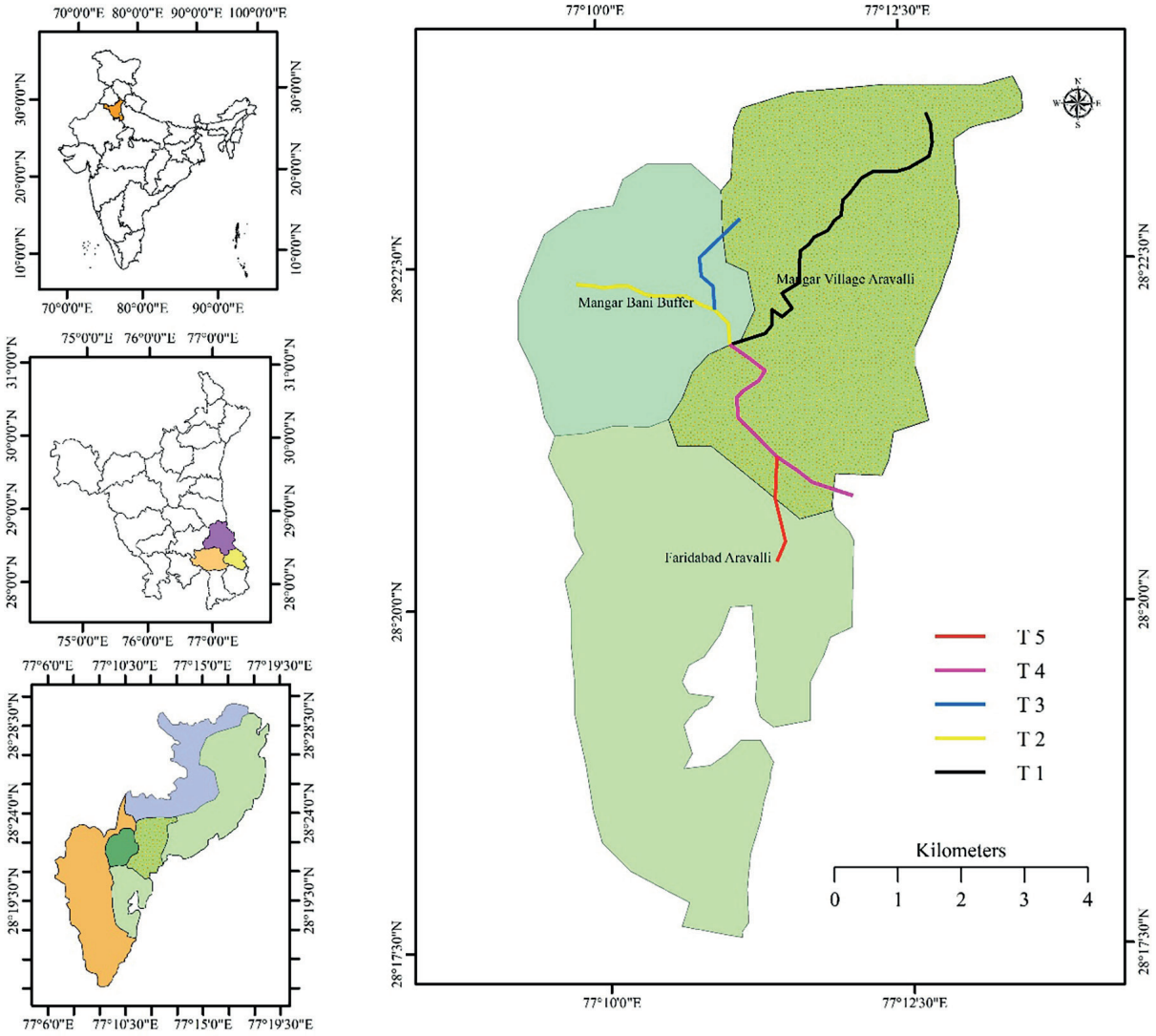


**Figure 2.** Location of Leucistic Large Grey Babbler sighting in Mangar Bani Forest, Aravalli Landscape, Haryana.

## RESULTS

During systematic avifaunal surveys in Mangar-Bani, Haryana, a leucistic individual of the Large Grey Babbler (*Argya malcolmi*) was observed on 12 October 2023. The bird was associated with a flock of seven individuals of Jungle Babblers foraging in ploughed farmland adjoining scrub habitats. The leucistic Large Grey Babbler exhibited extensive white and pale cream patches distributed over the remiges and tail feathers, while the iris, bill, and tarsi maintained typical pigmentation (Fig. 3 A-C) when compared to the Large Grey Babbler with normal plumage (Fig. 3 D).

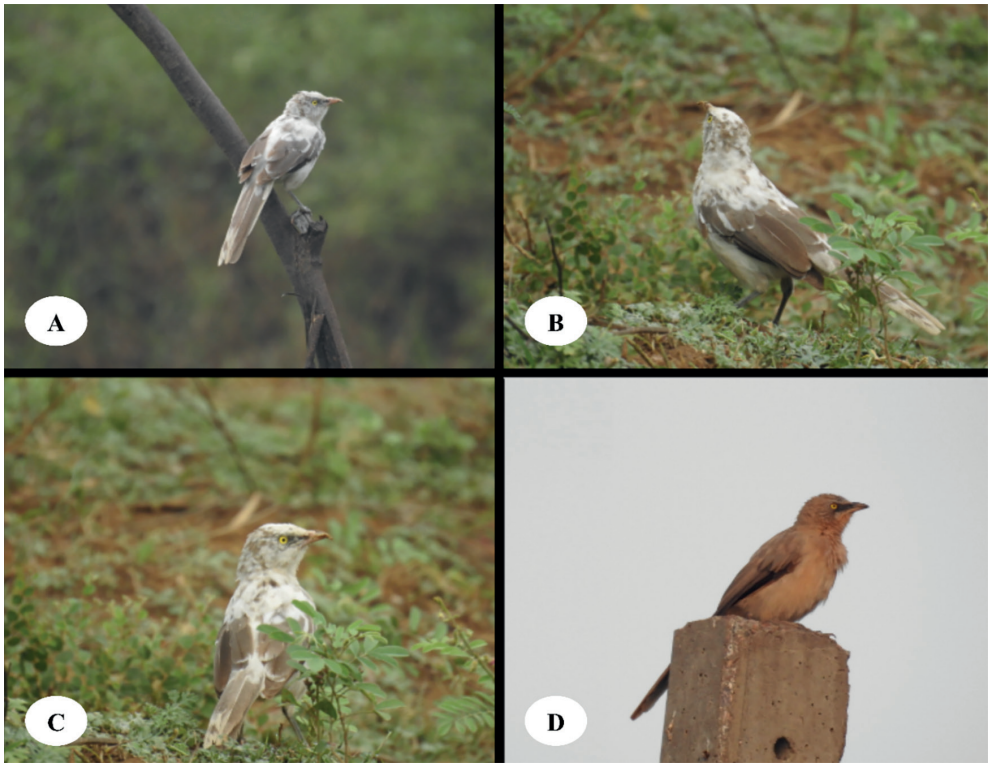


**Figure 3.** Spotting of Large Grey Babbler with Leucistic Plumage (A-C) and its comparison with normal plumage (D) in Mangar-Bani Forest Aravalli Landscape, Haryana, India.

This phenotype is consistent with leucism and distinct from albinism, as there was no loss of colour in the eyes or soft parts. The leucistic individual showed normal flocking, foraging, vocalization, and dust-bathing behaviors, with no signs of social exclusion or increased vigilance by conspecifics. Notably, the flock remained cohesive throughout the observation period, and the leucistic bird participated actively in all group activities. No signs of physical impairment, abnormal movement, or increased predation risk were observed during the field survey. The bird was photographed, and later used to confirm the leucism by comparison with literature (Avizanda et al., 2010; Dudgeon, 1904; Gurusami, 1992; Inglis, 1903; Javed, 1992; Mahabal, 1991; Pawashe et al., 2006). This observation has expanded the knowledge about leucism, adding to the smaller number of documented cases in Large Grey Babblers.

## DISCUSSION

The present study supports the first photographic reporting of partial leucism in the Large Grey Babbler from Aravalli Landscape of Haryana. Leucism, resulting from genetic mutations is recognized as the most frequent plumage aberration in birds worldwide, yet remains underreported in South Asian species (Grouw, 2021; Sinha & Gupta, 2023).

**Table 3.** Published records of Leucistic species of birds in India.

**Tabla 3.** Registros publicados de especies de aves leucísticas en la India.

| Sr. No. | Common Name | Location | Reference / Year | Description of Leucism |
|---|---|---|---|---|
| 1. | Jungle Babbler *Argya striata* | Gujarat | Newnham (1886) | Extensive white plumage with normal soft part pigmentation |
| 2. | Spotted Owlet *Athene brama* | Maharashtra | Pande et al. (2005) | White patches on the body and wings |
| 3. | Jungle Babbler *Argya striata* | Uttar Pradesh Pradesh | Sinha and Gupta (2023) | Irregular white plumage |
| 4. | Ashy-crowned Sparrow-Lark *Eremopterix griseus* | Maharashtra | Pawashe et al. (2006) | Entirely white plumage |
| 5. | Indian Peafowl *Pavo cristatus* | Tamil Nadu | Sathiyaselvam (2003) | White plumage, normal eye color |
| 6. | Black Drongo *Dicrurus macrocercus* | Rajasthan | Mahabal (1991) | White tail feathers, normal eyes |
| 7. | Indian Pond Heron *Ardeola grayii* | West Bengal | Gurusami (1992) | Large white patches on body |
| 8. | Red-vented Bulbul *Pycnonotus cafer* | Haryana | Sinha & Gupta (2023) | Patchy white plumage, normal eyes and bill |

Observation, confirmed through high-quality photographic evidence and detailed behavioral notes, adds a rare data point to the scientific literature and underscores the importance of systematic field surveys.

Although reports of leucism are limited in many species of Indian avifauna (Table 3), similar cases have been documented in Jungle Babbler (*Argya striata*) across the states of Gujarat and Uttar Pradesh (Gupte, 1969; Saini & Kasambe, 2007). Such uncommon reports reveal that plumage abnormalities are not restricted to a single avian species or region and the underlying mechanism is typically linked to genetic mutations with lack of deposition of melanin in feather even with functional melanin synthesis (Grouw, 2016; Koparde et al., 2014).

In nature leucistic individuals often may also face ecological disadvantages, including increased predation risk and potential challenges in mate acquisition. The reported leucistic babbler showed full species integration, with no evidence of social exclusion, impaired foraging, or heightened predation risk ethologically during the observation. This is also aligns with studies of other flocking species, where social tolerance often mitigates the fitness costs of conspicuous plumage (Sinha & Gupta, 2023). However, some studies also suggest that color or plumage aberrations may negatively impact mate selection or increase vulnerability to predators in nature (Grouw, 2021). The absence of such observation during study may reflect the social structure of *Argya malcolmi* or the protective benefits of group living. Ecologically, leucistic individuals may be more vulnerable to predation and less likely to acquire mates due to their conspicuous plumage appearance. However, flocking and cooperative behaviors, as seen in babblers, can mitigate these risks as documented in this study and many comparative studies from South Asia and Europe.

In India Large Grey Babbler population indicate a long-term decline of 16.39%, and within protected areas showing a slightly higher reduction (16.75%). Short-term annual trend (0.13%) appears stable (SoIB, 2023) and the overall pattern highlights a gradual decline with significant long-term implications. This suggests that forest areas with fragmented urban landscapes alone may not sufficiently safeguard the species where inbreeding caused by the urban isolation as genetic driver, edge effects, habitat degradation, and anthropogenic pressures persist. Documenting the plumage anomalies like leucism contributes to a broader understanding of dynamics of avian populations. The first recorded instance of a leucistic Large Grey Babbler in Mangar-Bani Forest, Faridabad surely provides a valuable addition to the existing literature. Further research is also needed to explore the occurrence of these leucistic individuals in other study areas and other bird species for assessing drivers of long term survival and reproductive success.

## CONCLUSION

Present study with report of partial leucism in the Large Grey Babbler in the state of Haryana, India, provides valuable inputs on plumage colour changes in Indian birds. Observations indicate that leucistic Large Grey Babbler individuals can successfully integrate within social groups in flocking species like *Argya striata*. It suggests that social structure in nature may buffer some of the ecological disadvantages commonly associated with plumage aberrations.

Occurrence of this type of example of partial leucism in a peri-urban forest like Mangar-Bani underscores the importance of habitat conservation in protected and human-dominated landscapes. Systematic documentation of these observations are crucial for ornithological records as well as for understanding of evolutionary processes. Further studies should aim for rigorous field monitoring studies to know the mechanisms, heritability, and fitness consequences of such phenomenon in bird species in amalgamation of genetic studies. Collaboration among field ornithologists, geneticists, and conservation practitioners will be more important for advancing knowledge regarding persistence of avian diversity in rapidly changing environments.

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## CONFLICT OF INTEREST

Authors declare no conflict of interest regarding this work.

## AUTHOR CONTRIBUTION

[Anju]: Conceptualization, fieldwork, data collection, analysis, manuscript drafting.
[Deepak Rai]: Conceptualization, Literature review, data analysis, manuscript revision & finalization.
Authors have read the final manuscript.

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