

doi: 10.4081/rio.2024.807

Submitted: 13-07-2024

Accepted: 15-11-2024

## Intersex plumage in Plum-headed Parakeet (*Psittacula cyanocephala*)

Rounak Choudhary<sup>1\*</sup>, Vivek Sharma<sup>2</sup>, Dipesh Kumar Jangir<sup>2</sup>, Subroto Dutta<sup>1</sup>

<sup>1</sup>Department of Environmental Science (Centre for Excellence), Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India.

<sup>2</sup>Department of Zoology, Maharshi Dayanand Saraswati University, Ajmer, Rajasthan, India.

\*Corresponding Author: [rounakchoudhary17@gmail.com](mailto:rounakchoudhary17@gmail.com)

### ABSTRACT

This note reports the first documented case of intersex plumage in a Plum-headed Parakeet from India. Keywords: Intersex plumage, *Psittacula cyanocephala*, Aravalli Hills, sexual dimorphism.

### RIASSUNTO

Piumaggio intersex nel parrocchetto testaprugna (*Psittacula cyanocephala*)

Questa nota riporta il primo caso documentato di piumaggio intersex nel parrocchetto testaprugna in India.

Parole chiave: Piumaggio intersessuale, dimorfismo sessuale, *Psittacula cyanocephala*, India.

### BACKGROUND

Birds exhibit some of the most remarkable sexual dimorphisms among vertebrates (Major and Smith, 2016). In species with distinct sexes, abnormal individuals with a combination of phenotypically male and female body parts are referred to as gynandromorphs, while organisms with intermediate sexual phenotypic features are referred to as intersexes (Fusco and Minelli, 2023). Intersex plumage in birds is a rare but unique occurrence in which individuals exhibit both male and female plumage traits. Birds with mixed plumage may be misinterpreted as hybrids, especially in parks, zoos, and other bird-breeding facilities where numerous species coexist (Johnsgard 1960, Reeber 2015). Although birds with intersex appearance are occasionally observed, descriptions are rarely comprehensive (Chiba & Honma 2011). Intersex birds appear to be quite infrequent. Obviously, they will only be discovered in sexually dimorphic species, where the males are morphologically distinguishable from the females.

The Plum-headed Parakeet (*Psittacula cyanocephala*) is a native bird species to South Asian countries such as India, Pakistan, Nepal, Bhutan, Bangladesh, and Sri Lanka (Grimmett et al., 1998). Plum-headed

parakeets are dimorphic as adults (Perry and Perry, 1996). Males grow a rich red-plum head that brightens over the forehead and turns bluish-purple on the hindcrown, nape, and lower cheeks. In females, a more moderate lavender-grey replaces the red-plum hue on the head (Rubin, 1990).

## **OBSERVATION**

This note documents the record of intersex plumage in a Plum-headed Parakeet in the Aravalli Hills of Ajmer (26°29'31.0"N 74°38'34.8"E), India (Figure 1). The individual was observed in early June 2024 among the usual adults on the *Leucaena leucocephala* tree. The observed individual had a lavender-grey head and other female characteristics such as the absence of a maroon shoulder-patch on the shoulder region and a dominant black ring in the neck, which are present in male (Ali, 2002), but it also had a noticeable red colouration on its forehead region, which only occurs in males, and had the size comparatively larger than females nearby.

## **DISCUSSION**

Several factors contribute to gynandromorphism and intersexuality in other organisms including genetic disorders, poly-spermic fertilization, interspecific hybrids, disturbed cleavage of fertilized cells, sex-determining genes in racial intercrosses, chromosomal aberrations or mutations and Environmental factors (Grant and Masteller, 1987; Narita et al. 2010; Santos et al., 2019; Fusco and Minelli, 2023). The presence of red pigmentation in the forehead region, which is more often associated with males, along with the female-typical lavender-grey head, demonstrates the mixed expression of secondary sexual traits.

Previous records of intersex in birds were observed in ducks like mallard (Sjögren and Waldenström, 2021), Northern Pintail (Chiba and Honma, 2011.) While gynadomorphism was recorded in many instances including Evening Grosbeak (Laybourne, 1967), Black Redstart (Weggler 2005; Martinez, 2020), Northern Cardinal (Bohlen 2006), Eastern Towhee (Brenner et al. 2019), Green Honeycreeper (Murillo et al., 2023). Stepniewski and Surmacki (2023) recorded gynandromorphism in Bearded reedling and summarized the phenomenon in about 43 bird species.

This finding adds to the expanding information on intersex plumage in birds, emphasizing the need for more research into the genetic and environmental variables that influence this phenomenon. Understanding underlying mechanisms can reveal information about avian biology, sexual differentiation, and the effects of environmental stressors on wildlife. The one here documented is the

first recorded case of intersex plumage in a female Plum-headed Parakeet and family Psittaculidae and adds one more species to the list of those presenting intersex plumage in the wild.

## ACKNOWLEDGEMENTS

This observation is a part of a project funded by the Department of Science and Technology, Government of India through DST-INSPIRE Fellowship Program for Research.

## REFERENCES

- Ali S., 2002 - The book of Indian birds. 13th revised edition: Bombay Natural History Society. Mumbai.
- Bohlen HD., 2006 - Illinois sightings of bilateral gynandromorphism in birds. Living Museum, 68: 15–16.
- Brenner SJ., DaRugna OA. & McWilliams SR., 2019 - Observations of certain breeding behaviors in a bilateral gynandromorph Eastern Towhee (*Pipilo erythrophthalmus*). Wilson Journal of Ornithology, 131: 625–628. <https://doi.org/10.1676/18-179>
- Chiba A. & Honma R., 2011 - A study on the Northern Pintail (*Anas acuta*) females with masculinized plumage: their prevalence, morphological and behavioural traits, and reproductive organs. Journal of Ornithology, 152: 733–742. <https://doi.org/10.1007/s10336-011-0654-9>
- Fusco G. & Minelli A., 2023 - Descriptive versus causal morphology: Gynandromorphism and Intersexuality. Theory in Biosciences, 142: 1–11. <https://doi.org/10.1007/s12064-023-00385-1>
- Grant PM. & Masteller EC., 1987 - Intersexuality in Ephemeroptera: Description of Four Specimens and Comments on Its Occurrence in a Parthenogenetic Species. Canadian Journal of Zoology, 65: 1985–1988.
- Grimmett R, Inskipp C. & Inskipp T., 1998 - Birds of the Indian subcontinent. London.
- Johnsgard PA., 1960 - Hybridization in the Anatidae and its taxonomic implication. The Condor, 62: 25–33. <https://doi.org/10.2307/1365656>
- Laybourne RC., 1967- Bilateral Gynandromorphism in an Evening Grosbeak. The Auk, 84(2): 267–272. <https://doi.org/10.2307/4083196>
- Major AT. & Smith CA., 2016 - Sex Reversal in Birds. Sexual Development, 10 (5-6): 288–300. <https://doi.org/10.1159/000448365>
- Martinez N., 2020 - Observations on a presumed bilateral gynandromorph Black Redstart *Phoenicurus ochruros* paired with a male. Ornis Svecica, 30: 31–37. <https://doi.org/10.34080/os.v30.20412>

Murillo J., Campbell-Thompson E., Bishop T., Beck C. & Spencer H., 2023 - Report of bilateral gynandromorphy in a Green Honeycreeper (*Chlorophanes spiza*) from Colombia. *Journal of Field Ornithology*, 94. <https://doi.org/10.5751/JFO-00392-940412>

Narita S., Pereira RAS., Kjellberg F. & Kageyama D., 2010 - Gynandromorphs and intersexes: potential to understand the mechanism of sex determination in arthropods. *Terrestrial Arthropod Reviews*, 3(1): 63. <https://doi.org/10.1163/187498310X496190>

Perry F. & Perry L., 1996 - The Beautiful Plum-headed Parakeet. *AFA Watchbird*, 23(6): 24-26.

Reeber S., 2015 - Wildfowl of Europe, Asian and North America. *Helm Identification Guides*. Bloomsbury Publishing, London.

Rubin LS., 1990 - Breeding Notes on the Plumhead Parakeet. *AFA Watchbird*, 17(3): 39-42.

Santos RP., Moreto V. & Mariano R., 2019 - Intersexuality in *Farrodes Peters*, 1971 (Ephemeroptera: Leptophlebiidae: Atalophlebiinae) from Brazil. *Revista Brasileira de Entomologia*, 63: 202–204.

Sjögren AK. & Waldenström J., 2021 - Plumage changes in an intersex Mallard *Anas platyrhynchos* over a six-year period. *Ornis Svecica*, 31: 68–74. <https://doi.org/10.34080/os.v31.22427>

Stepniewski J. & Surmacki A., 2023 - The first case of bilateral gynandromorphic plumage type in the bearded reedling *Panurus biarmicus*. *The European Zoological Journal*, 90(2): 643-647. <https://doi.org/10.1080/24750263.2023.2231000>

Weggler M., 2005 - Sexualverhalten und Fortpflanzungsfähigkeit eines wahrscheinlich gynandromorphen Hausrotschwanzes *Phoenicurus ochruros*. *Ornithologische Beobachter*, 102: 145–152.

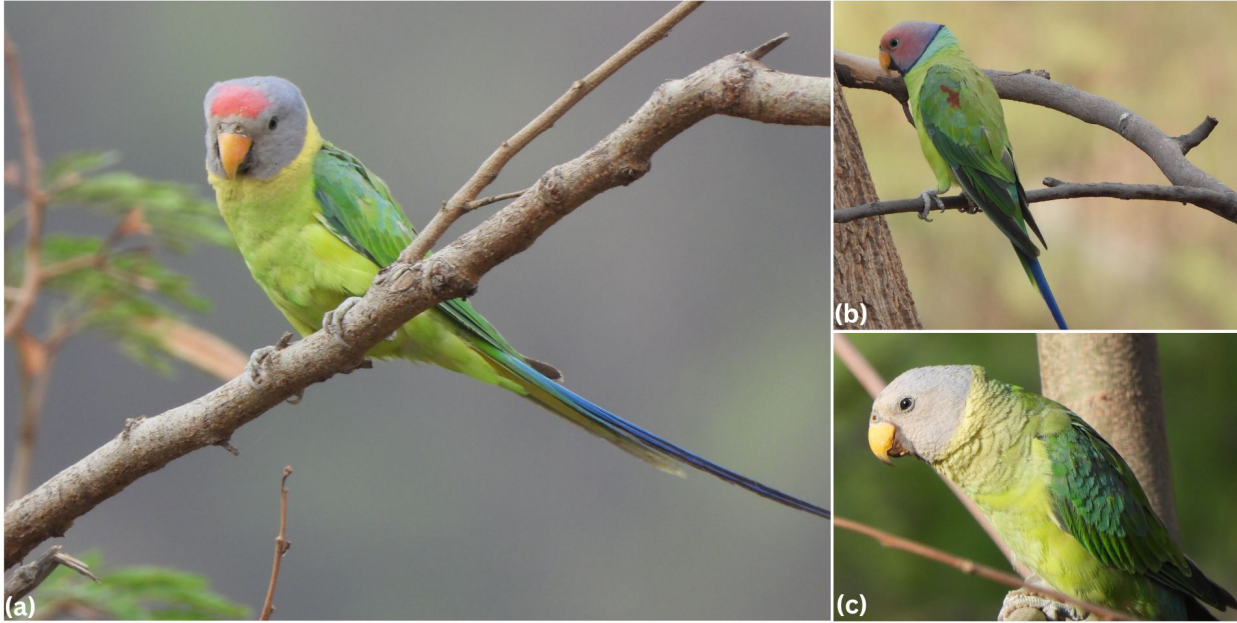


Figure 1. (a) Intersex plumage in female Plum-headed Parakeet, (b & c) male and female with normal plumages. / (a) Piumaggio intersex nella femmina del Parrocchetto testapugna, (b e c) maschio e femmina con piumaggio normale.