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White-haired *Trachypithecus cristatus* on Gunung Kubing, Belitung

Leucism differs from albinism because it does not entirely inhibit melanin production but reduces pigmentation in some areas. It is often linked to low genetic diversity caused by geographic isolation and inbreeding (Barros-Diaz *et al.* 2022). Leucism is a rarely reported phenomenon in primates. Reported cases in Asia include leucistic individuals of *Trachypithecus obscurus* (dusky leaf monkey) in Langkawi, Malaysia (Najmuddin *et al.* 2020) and *Semnopithecus vetulus* (purple-faced langur) in Sri Lanka (Roscoe *et al.* 2013). In the near kampung Bilit, Kinabatangan, Sabah, Lhota *et al.* (2022) report *Trachypithecus cristatus* (silvery langur) with a specific reduction in pigmentation, leading to uneven off-white patches appearing on different areas of the body. A notable historical report describes a silvery langur with red hair in North Borneo (Allen & Coolidge 1940), suggesting that hair colour anomalies have been occurring sporadically across langur populations (Harding 2011).

The silvery langur (*Trachypithecus cristatus*) is a primate belonging to Cercopithecidae, subfamily Colobinae (Davies & Oates 1994). The distribution of this species in Southeast Asia includes the islands of Borneo (Kalimantan, Sabah, Sarawak, and Brunei), Java, and several islands in the Riau Islands, Sumatra, including Belitung Island (Mittermeier *et al.* 2013; Rianti *et al.* 2023), which were once connected during Pleistocene low sea levels (Bird *et al.* 2005). The population distribution of *T. cristatus* in Belitung is poorly understood (the residents report approximately more than 100 individuals), and residents have reported sightings of white-haired langurs, which were later encountered by our team.

Habitat isolation on Belitung Island has contributed to low genetic variation in silvery langurs, primarily due to restricted gene flow and increased mating within adjacent groups. This genetic bottleneck may lead to mutations, whereby some manifest as phenotypic traits, such as hair colour dimorphism. Reports from residents on Belitung Island describe hair colour dimorphism in the silvery langur population on Gunung Kubing. Specifically, a white-haired individual has been observed, which local folklore associates with ancestral significance. According to local narratives, the white langur is considered a spiritual or ancestral figure, a belief rooted in stories passed down through generations.

The first documented white-haired langur was uploaded to Instagram by the account *tebat_rasau_lintang* in December 2018. The observation took place in Lintang Village, but no additional information about the white-haired langur was provided. Subsequently, our research team collected fecal samples for genetic analysis of *Trachypithecus cristatus* on Gunung Kubing, Belitung. Here, we encountered white-haired langurs in October 2023 and July 2024. In October 2023, two leucistic adult individuals of unidentified sex were found in a forested area of Gunung Kubing. Later, in July 2024, a female adult and a juvenile were spotted in a rubber plantation near Gunung Kubing with 20 typically dark individuals without any signs of social isolation. Additional findings indicate that the Regional Technical Implementation Unit of the Tourism Development Center for the Belitung Region (UPTD Balai Pengembangan Pariwisata Wilayah Belitung), in collaboration with the Village Forest Management Institution of Perpat (LPHD Perpat), has developed a tourism package featuring white-haired langur observation. According to villagers, white-haired langurs have

existed for over 100 years and represent a “new species endemic to Belitung” (Source: Peramun.com), though this was never proven. Furthermore, it is regarded as a spiritual or ancestral figure, a traditional belief deeply rooted in folklore passed down through generations (Diardi, pers. comm.).

Our observations indicate that this white colour trait may be heritable. The offspring with white hair was carried by a white-haired mother, suggesting a genetic basis for this anomaly. A detailed description of the white-haired langurs reveals that their facial and palm pigmentation remains black despite their white body hair, indicating melanin's presence in specific regions (Fig. 1). This pattern is consistent with leucism, a condition caused by a genetic mutation affecting pigmentation development (Acevedo & Aguayo 2008).



Figure 1. Comparison of *Trachypithecus cristatus* fur colour on Gunung Kubing, Belitung: (A) typically dark hair colour and (B) white hair colour (leucistic)

We did a preliminary analysis using collected fecal samples from the area with the cytochrome b gene as the marker. While cytochrome b does not directly influence the expression of white hair colouration, it serves as a genetic marker for identifying similarities between the silvery langur population on Gunung Kubing and those in other regions. The langur population on Gunung Kubing shares the closest genetic distance with the Sumatra population (0.78%), whereas the intra-population genetic distance is 0.44% (unpublished result). This pattern is consistent with phylogenetic relationships previously established for the *T. cristatus* group

(Roos *et al.* 2008). Although our mitochondrial marker provides only a partial view of genetic variation, chromosomal data also support limited intraspecific differentiation in *T. cristatus* across its range (Xiaobo *et al.* 2013). Overall, these findings suggest that the langur population in Belitung does not represent a distinct species.

The correlation between phylogenies and pelage phenotypes in wild primates may be weak or absent (Bradley & Nicholas, 2008). This suggests pelage colour variation often arises due to recent local adaptations rather than deep phylogenetic divergences. Environmental stressors, such as pollution and habitat degradation, have also been implicated as potential triggers for leucism in some species (Barros-Diaz *et al.* 2022). Although genetic factors are strongly implicated in leucism, ongoing research is needed to clarify the interplay between genetic mutation, environmental stress, and other potential influences. Such studies could provide valuable insights into the evolutionary dynamics and adaptive significance of phenotypic anomalies like leucism in primate populations.

Acknowledgments. This study was funded by the Directorate General of Higher Education, Research, and Technology of The Ministry of Education, Culture, Research, and Technology by the 2024 Research Program Implementation Contract Number: 027/E5/PG.02.00.PL/2024 dated June 11, 2024. We thank Belitung Regency, Belitung UNESCO Global Geopark, Indonesian Tourism Association, Iswandi, Erling Rinanto, and the Hariman family for supporting this study; Andie Ang (Singapore), Nadine Ruppert (University of Science Malaysia), and Vincent Nijman (Oxford Brookes University, UK) for reviewing the manuscript.

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Submitted: 28 Dec 2024, Accepted: 21 Apr 2025
Subject Editor: Vincent Nijman

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