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Cover: Emperor Tamarin *Saguinus imperator*: a look into a better world through the mustache lens – mixed media illustration. © Maya Santhanakrishnan.

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COMMUNICATION

First record of albinism in Lesser Woolly Horseshoe Bat *Rhinolophus beddomei* (Chiroptera: Rhinolophidae) with an updated list of chromatic aberrations in bats in India

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Abstract: There have been worldwide reports of chromatic aberrations in bats, most striking among which is albinism. Albinism is an inherited, hypo-pigmentary state characterised by a complete lack of melanin. Albinistic individuals have pale skin, white fur, and pinkish-red eyes. Here we report the first record of albinism in Lesser Woolly Horseshoe Bat *Rhinolophus beddomei.* During a bat survey in Goa, India; a single individual of albino Lesser Woolly Horseshoe Bat was recorded along with a normally coloured conspecific individual from a small shelter with tiled roof. We confirm the species identity of this bat based on its morphology, and acoustic characteristics of its echolocation call. We further update the list of colour aberrations in bats reported from India.

Keywords: Acoustic signature, albino, chiroptera, documentation, echolocation, Goa, horticulture, pigmentation, shelter.

Konkani: आज मेरेन संवसार भर जाल्ल्या संशोधनातल्यान अशे दिसून आयलां, कीं वागोळ्यांच्या कातीच्या कोराच्या दोशां भितर 'अल्बिनिसम' हो प्रकार असादारण जावन आसा. 'अल्बिनिसम' म्हळ्यार एक अनुवांशिक दोश, जाका लागून वागोळ्याच्या काती भितर 'मेलॅनिन' हया रंगद्रव्याचो आस्पाव जायना. अश्या वागोळ्यांची कात धवी-फटफटीत, लंव धवी, आनीक दोळे लेव गुलाबी रंगाचे आसतात. हया सोद निंबधात आमी 'लेसर वूली हॉर्स शू' म्हळ्यार व्हिनोलॉफस बेडोमाई हया वागोळ्याच्या प्रजाती भितर अल्बिनिसमाचो संवसारांतलो पयलो अहवाल सादर करतां. गोयांत सापडपी वागोळ्यांच्या प्रजातींच्या विविधतायेच्या अभ्यासा खातीर केल्या एका सर्वेक्षणात, आमका एका पोरन्या घराच्या नळयाच्या पाख्या पोंदा, माडाच्या वाश्यांचेर 'लेसर वूली हॉर्स शू' हया प्रजातीचे एक जोडपें दिसले, तातूंतले एक वागोळे नेमा प्रमाण कातीच्या कोराचे आशिल्लें, जाल्यार दुसरे वागोळे 'अल्बिनो' आशिल्लें. हया वागोळ्यांची प्रजाती वळखूपा खातीर आमी तांच्या आकृती विज्ञानाचो आणि प्रतिध्वनी लहरींचो अभ्यास केलो. आज मेरेन भारत देसांतल्या वागोळ्यां भितर मेळळील्या कातीच्या कोराच्या दोशांच्या वळेरीन आमी नवी भर घाल्या.

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Author contributions: Pratiksha Sail conducted the fieldwork, analysed the data and wrote the first draft of the manuscript. Manoj Borkar conceptualised and planned the fieldwork, critically reviewed and edited the manuscript.

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INTRODUCTION

Abnormal pigmentation of skin and its derivatives are results of chromatic disorders (Rook et al. 1998). They are caused either by a deficiency or an excess of melanin (Hofreiter & Schöneberg 2010; Abreu et al. 2013). These are reported in many vertebrate groups and classified under broad terms such as hypopigmentation and hyperpigmentation (Uieda 2000). Based on the mutations and phenotypic effects, pigmentation disorders can be classified as albinism, leucism, piebaldism, hypomelanism and melanism (Lucati & Lopez-Baucells 2016). Hypopigmentation cases are, however, most easily detected. Pigmentation disorders and unusual coloration occur because of mutations in genes expressing for skin and fur coloration in animals (Fertl & Rosel 2002; Alexis & Marin-Vasquez 2018).

Albinism is an inherited, hypo-pigmentary disorder characterised by a complete lack of melanin. It is caused by absence of the enzyme tyrosinase that causes individuals to have pale skin, white fur or feathers, and pinkish - red eyes (van Grouw 2006, 2013; Hofreiter & Schöneberg 2010). Albinism is controlled by an autosomal recessive gene (van Grouw 2006; Falcão 2014). Due to their nocturnal and cryptic habits, bats with atypical colouration are difficult to observe, and reports on aberrant bat skin and hair colouration are very infrequent. Though many reports of albino bats have come from different parts of the world, records of albinism in Indian bat species are scarce (Khajuria 1972, 1984; Karim 1983; Bhati 1988; Senacha & Purohit 2005; Aul & Marimuthu 2006; Devkar et al. 2011; Dhanya et al. 2015; Singh & Yadav 2016; Mahabal et al. 2019). Also, some workers have suggested that albinism is rare in bats (Uieda 2000; Devkar et al. 2011; Tello et al. 2014). According to recent reviews, of the approximately 1,300 species of bats in the world, chromatic aberrations have been reported from 115 species belonging to 11 families (Lucati & Lopez-Baucells 2016) and albinism has been described in 60 species (Zortea & Silva 2017).

Here we report a case of albinism in the Lesser Woolly Horseshoe Bat *Rhinolophus beddomei*. This paper presents the first record of chromatic aberration seen in this species. We provide an updated list of chromatic aberrations in bats reported from India for referral purpose.

MATERIALS AND METHODS

During a reconnaissance survey of bats in South Goa on 29 October 2023 at 1630 h (IST), we observed a pair of Lesser Woolly Horseshoe Bat *Rhinolophus beddomie* Andersen, 1905 roosting in a small shelter with tiled roof (15.24643056˚ N & 74.21220833˚ E) in a horticultural landscape (Figure 1 & Image 1). The shelter had two rooms with one used as a pump house, and the other as an unused lavatory. The temperature and humidity of the roost site were measured using a digital thermo-humidity meter (Aceteq). Echolocation calls were recorded using Echo Meter Touch 2 (Wildlife Acoustics, USA). The recorded calls were analysed using Raven Pro 1.6.5 software. Frequency of maximum energy (FMAXE, in kHz) and duration (d, in ms) were considered as bioacoustics parameters (Wordley et al. 2014).

RESULTS

The temperature and humidity in the room where the bats roosted were 33.2˚ C and 75%, respectively. The pair of bats was clinging on to the Coconut Palm *Cocos nucifera* wood frame beneath the roof tiles at the height of 2.5 m above ground. Each individual occupied a separate wood frame, separated by a distance of 0.5 m (Image 1). The pelage and patagium of the normally coloured individual were typically dark greyish-brown and woolly, rough-textured, and notably grizzled on the upper side (Image 2). The albino individual had white skin, fur on its entire body and pale pinkish ears and eyes. In this individual, the blood vessels were seen through the skin of the patagium (Image 3). Both the individuals of the pair had similar body sizes, and were identified as the Lesser Woolly Horseshoe Bat, based on the distinctive morphological features (Bates & Harrison 1997; Srinivasulu et al. 2010) (Images 2 & 3). The owner of this shelter revealed that this albino individual has been roosting in this place since last five years.

Lesser Woolly Horseshoe Bat echolocation call has Frequency-modulated (FM) and Constant-frequency (CF) components. Since bat ultrasonic sounds are species specific, we also recorded the bioacoustics aspect. The characteristics of recorded calls were typical FM/CF/FM, emitted by Rhinolophid bats; with a short upward FM sweep followed by a long CF component, followed by a short downward FM sweep as previously corroborated (Raghuram et al. 2014; Srinivasulu et al. 2023) (Image 4). The calls (n = 20 pulses) had a mean FMAXE of 41.00 kHz, and a mean duration of 84.11 ± 7.6 ms. The observed

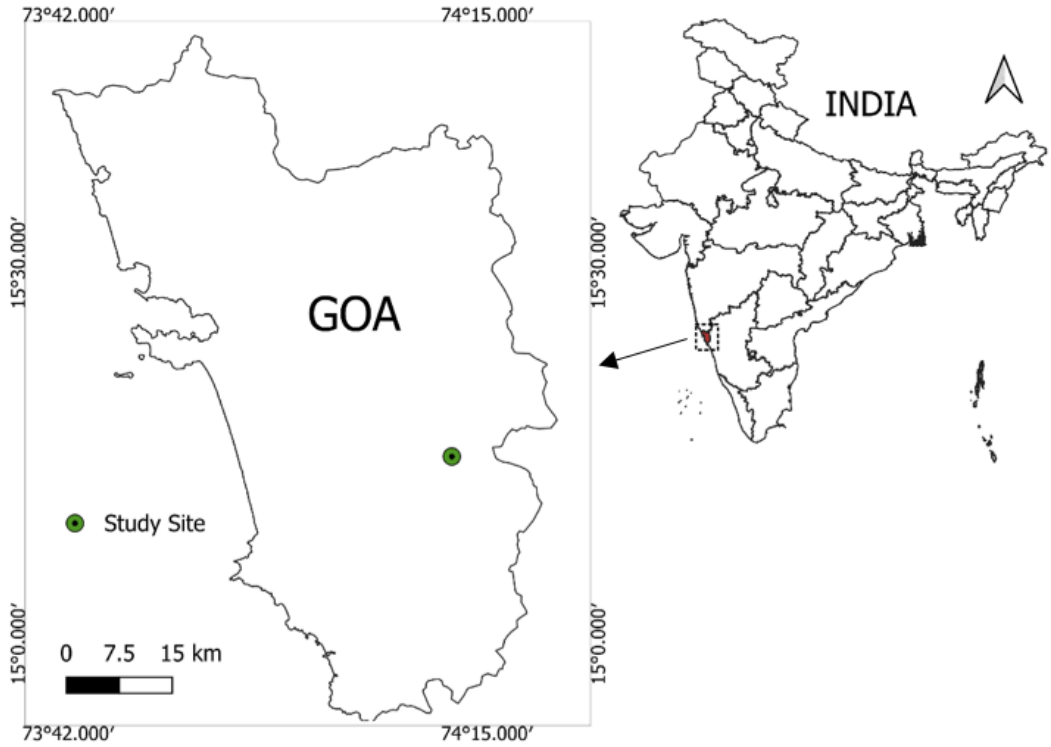

Figure 1. Map showing location of albino and normal coloured Lesser Woolly Horseshoe bat reported in the study.

Table 1. Summary of records of chromatic aberration in bats reported from India.

Species	Chromatic aberration	n	Sex	Habitat	Location State/ Union territory	Biogeographic zone	Reference
Megachiroptera							
Pteropodidae							
Rousettus leschenaultii	Albinism	1	♀	Mine	Maharashtra	Deccan Peninsula	Karim (1983)
Microchiroptera							
Rhinolophidae							
Rhinolophus beddomei	Albinism	1	-	Shelter with tiled roof	Goa	Western Ghats	Present Study
Hipposideridae							
Hipposideros diadema nicobarensis	Albinism	2*	♂	Cave	Nicobar Islands	Island	Aul & Marimuthu (2006)
Hipposideros lankadiva	Albinism	1	-	Temple	Madhya Pradesh	Deccan Peninsula	Khajuria (1984)
Hipposideros sp.	Albinism	1	-	Cave	Madhya Pradesh	Deccan Peninsula	Khajuria (1972)
Rhinopomatidae							
Rhinopoma hardwickii	Albinism	1	♀	Cave	Madhya Pradesh	Deccan Peninsula	Khajuria (1972)
Rhinopoma hardwickii	Piebaldism	3	-	Building	-	-	Senacha & Purohit (2005)
Rhinopoma hardwickii	Albinism	1	-	Cave	Rajasthan	Desert	Singh & Yadav (2016)
Rhinopoma microphyllum	Albinism	1	♂	Building	Rajasthan	Desert	Bhati (1988)
Rhinopoma microphyllum	Albinism	1	-	Mine	Gujarat	Semi-arid	Devkar et al. (2011)
Emballonuridae							
Taphozous sp.	Albinism	1	-	Fort	Delhi	Semi-arid	Dhanya et al. (2015)

* One dead individual, no information on sex

Image 1. Roost site of the normal coloured and albino bat, *Rhinolophus beddomei*. © Pratiksha Sail.

attributes tally with acoustic signature of *Rhinolophus beddomei.*

In India, chromatic aberrations in bats have been reported among eight species, one of Megachiroptera and seven species of Microchiroptera. Thus far a total of 14 individuals have been reported with cases of chromatic aberrations, 11 of albinism and three of piebaldism.

DISCUSSION

Pigmentation anomaly is a rare phenomenon in nature; however, studies have reported such cases in bats from different parts of the world. In their robust global review, Zortea & Silva (2017) have listed 60 species of bats with cases of albinism. Lucati & Lopez-Baucells (2016) have listed 269 individual records of piebaldism, 152 of albinism, 94 of melanism, 20 of hypomelanism, 11 of leucism, and three of partial melanism; in 60 bats the chromatic disorder being 'undetermined'. After both these reviews, there have been more reports of albino bats from across the world (Cichocki et al. 2017; Moreno et al. 2020; Aguilar-lopez et al. 2021; Leal & Ramalho 2021; Leal et al. 2021; Ventorin et al. 2021).

From India, including the present study, cases of chromatic aberrations have been reported in only eight species of bats (Table 1). Of the 14 individuals with chromatic aberrations listed, 11 are of albinism and three of piebaldism. Senacha & Purohit (2005) had incorrectly reported three individuals of *Rhinopoma hardwickii* as cases of partial albinism, however subsequently it has been revised as piebaldism (Lucati & Lopez-Baucells 2016; Mahabal et al. 2019). The reported cases from India are from families: Pteropodidae, Rhinolophidae, Hipposideridae, Rhinopomatidae, and Emballonuridae. In India most cases of albinism have been reported in Hipposideridae, followed by Rhinopomatidae.

The present study is the first record ever for albinism in *Rhinolophus beddomei* across the globe, and the first record of chromatic aberrations reported from bats in Goa, India; increasing the cases of albinism in rhinolophids to five. Chromatic aberrations are designated based on the phenotypic effect. The individual in this study presented pale pinkish coloured eyes. In albino individuals, the phenotype shows all-white hairs, pale skin and pinkish-red eyes (Lucati & Lopez-Baucells 2016; Moreno et al. 2020). Previously for the Genus *Rhinolophus*, albinism has been reported from Little Japanese Horseshoe Bat *Rhinolophus cornutus* (Sawada 1990), Mediterranean horseshoe bat *Rhinolophus euryale* (Dorst 1957), Greater horseshoe bat *Rhinolophus ferrumequinum* (Allen 1939; Fontanel 2001; Frontera 2002; Prevost et al. 2011), and Lesser Horseshoe Bat *Rhinolophus hipposideros* (Horaček 1995; Redant 2002).

Efforts at compiling systematic records of pigmentary anomalies in bats is low, and the ecological implications of these anomalies remain unclear (Romano et al. 1999). Most of the bat species in which albino individuals were recorded, including the present study; occupy sheltered roosts like caves, mines, and buildings (Uieda 2000). The absence of pigmentation could present a disadvantage for concealment, communication, and physiological regulation (Caro 2005). Some workers theorise that hypopigmentation is detrimental to bats; due to poor

Image 2. Normal coloured individual of *Rhinolophus beddomei*. © Pratiksha Sail.

Image 3. Albino individual of *Rhinolophus beddomei*. © Pratiksha Sail.

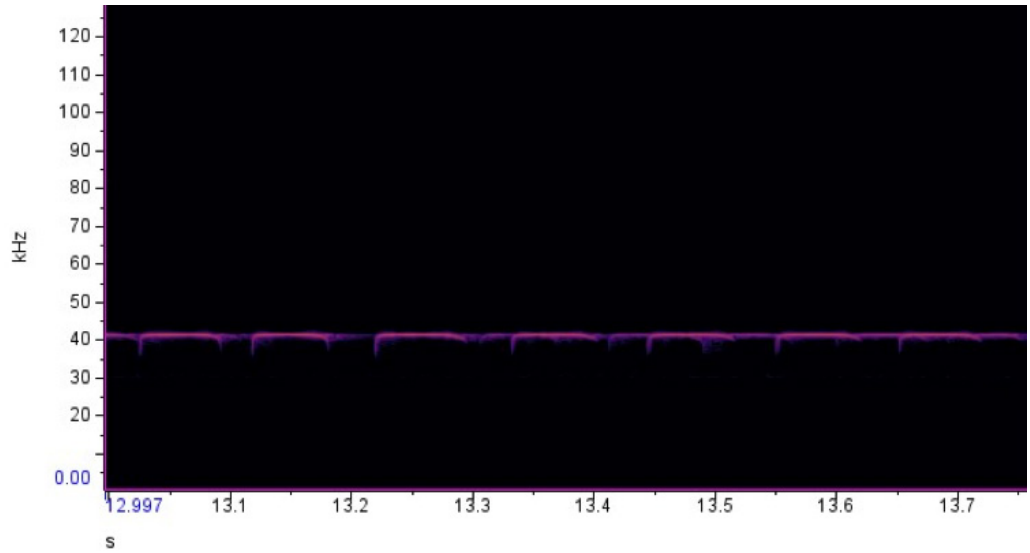

Image 4. Spectrogram recorded from echolocation calls of *Rhinolophus beddomei*.

vision, greater predation risk, lower mating success and lower survival rates (Caire & Theis 1988; Caro 2005; Oliveira & Aguiar 2008). Also, Oliveira & Aguiar (2008) suggest that sheltered roosts offer a clear advantage for the survival of albino bats, providing them protection against sunlight, water loss, and predation. However, there is no validation of such putative effects in bats with hypopigmentation or any chromatic aberrations. López-Baucells et al. (2013) argue that pigmentary disorders hardly influence survival of species that are affected.

Insectivorous bats use echolocation for orientation and foraging; and as such hypopigmentation may have no effect on their survival (Lucati & Lopez-Baucells 2016). Though, a lack of pigment in the eyes may negatively affect vision in fruit eating bats, as they rely heavily on vision and olfaction to navigate and forage (Guillery 1996; Rydell & Eklöf 2003; Heiduschka & Schraermeyer 2008; Moreno et al. 2020). Albinism is a rare inherited abnormality and its frequency of occurrence could likely be increased with inbreeding (Stevens et al. 1997). For this reason, it could be more common in colonial species of bats where individuals have strong fidelity to their roosts.

That the albino bat reported in this study has been seen in the same place by the farm owner for the past five years, clearly hints at site fidelity, and this merits discussion. Brack & Johnson (1990) observed same albino individual of *Myotis sodalis* in a cave in Indiana (USA) in 1985, 1987 and 1989, Sánchez-Hernández et al. (2010) recaptured the same two albino individuals of *Desmodus rotundus* bats in 2008–2009 in a tunnel in Guerrero (Mexico), all these reports highlighting no effect of colour aberration and establishing that albino bats can survive for several years. Likewise, there are several reports of pregnant or lactating albino bats, refuting the idea of lower mating success in bats with colour aberrations (Brigham & James 1993; Talerico et al. 2008; Sánchez-Hernández et al. 2010; Rocha et al. 2013).

Efforts towards systematic records of pigmentary anomalies in bats is low, and their ecological implications remain unclear (Romano et al. 1999). Recent times have seen an increased number of publications reporting pigmentation anomalies in bats (Cichocki et al. 2017; Moreno et al. 2020; Aguilar-lopez et al. 2021; Leal & Ramalho 2021; Leal et al. 2021; Ventorin et al. 2021). Such reports are important to understand the evolutionary cost and benefits arising from chromatic disorders. Continuous documentation of chromatic aberrant bats will help understand geographic trends of albinism and allied pigment anomalies in bats, and further appreciate ecological effects of these anomalies on bat survival rates in natural populations (Lucati & Lopez-Baucells 2016).

REFERENCES

Abreu, M.S.L., R. Machado, F. Barbieri, N.S. Freitas & L.R. Oliveira (2013). Anomalous colour in Neotropical mammals: a review with new records for *Didelphis* sp. (Didelphidae, Didelphimorphia) and *Arctocephalus australis* (Otariidae, Carnivora). *Brazilian Journal of Biology* 73: 185–194. https://doi.org/10.1590/S1519-69842013000100020

Aguilar-López, M., P.A. Aguilar-Rodríguez, J. Cruzado-Cortés, M.C. MacSwiney & J. Ortega (2021). Noteworthy records of abnormal coloration in Mexican bats. *Therya Notes* 2: 112–116. https://doi.org/10.12933/therya_notes-21-46

Alexis, C.R. & A. Marin-Vasquez (2018). Rare colour aberration in the short-tailed fruit bats (*Carollia perspicillata*). *Biodiversity International Journal* 2(1): 00045. https://doi.org/10.15406/bij.2018.02.00045

Allen, G.M. (1939). *Bats*. Dover Publications Inc., New York: 368.

Aul, B. & G. Marimuthu (2006). Sighting of an albino bat in a colony of cave-dwelling microchiropteran, *Hipposideros diadema nicobarensis* at the Nicobar Islands. *Current Science* 90: 912–914.

Bates, P.J.J. & D.L. Harrison (1997). *Bats of the Indian Subcontinent*. Harrison Zoological Museum, UK, 258 pp.

Bhati, U.S. (1988). Occurrence of an albino rat-tailed bat *Rhinopoma microphyllum kinneari* Wroughton in the Indian desert. *Journal of the Bombay Natural History Society* 85: 608.

Brack, V. & S.A. Johnson (1990). Albino Indiana bat (*Myotis sodalis*). *Bat Research News* 31: 8.

Brigham, R.M. & A.K. James (1993). A true albino little brown bat, *Myotis lucifugus*, from Saskatchewan. *Blue Jay* 51: 213–214.

Caire, W. & M. Theis (1988). Notes on the occurrence of morphological and color aberrations in bats from Oklahoma, Missouri, and Mexico, pp. 75–76. In: Proceedings of the *Oklahoma Academy of Science*.

Caro, T. (2005). The adaptive significance of coloration in mammals. *BioScience* 55: 125–136. https://doi.org/10.1641/0006-3568(2005)055[0125:TASOCI]2.0.CO;2

Cichocki, J., G. Lesiński, K. Piksa, A. Ważna, M. Warchałowski, A. Bator, I. Gottfried, T. Gottfried, W. Gubała, R. Jaros & M. Kowalski (2017). Aberrant colouration in bats from Poland. *North-Western Journal of Zoology* 13: 2.

Devkar, R.V., S. Jayaraman, K. Upadhyay & P. Patel (2011). Albino microchiropteran, *Rhinopoma microphyllum kinneri* sighted in a bat colony inhabiting abandoned mines. *Current Science* 100: 165–166.

Dhanya, V., A. Mahabal & S. Thakur (2015). A first record of albinism in tomb bat *Taphozous* sp. (Chiroptera: Emballonuridae) from India. *Small Mammal Mail* 7: 6–9.

Dorst, J. (1957). Un cas d'albinismecomplet chez un *Rhinolophe euryale. Mammalia* 21: 306.

Falcão, F.C. (2014). First record of complete albinism in *Carollia perspicillata* (Chiroptera; Phyllostomidae). *Chiroptera. Neotrop*ical 20(1): 1234–1236.

Fertl, D. & P.E. Rosel (2002). Albinism, pp. 16–18. In: Perrin W.F., B. Würsig B & J.G.M. Thewissen. *Encyclopedia of Marine Mammals*. Academic Press, San Diego.

Fontanel, B. (2001). Chauves-souris. *Mango*, Paris, 127 pp.

Frontera, J.E. (2002). Grand rhinolophe albinos. *Envol des Chiros* 6: 3.

Guillery, R.W. (1996). Why do albinos and other hypopigmented mutants lack normal binocular vision, and what else is abnormal in their central visual pathways? *Eye* 10: 217–221.

Heiduschka, P. & U. Schraermeyer (2008). Comparison of visual function in pigmented and albino rats by electroretinography and visual evoked potentials. Graefe's Archive for Clinical and Experimental *Ophthalmology* 246: 1559–1573.

Hofreiter, M. & T. Schöneberg (2010). The genetic and evolutionary basis of colour variation in vertebrates. *Cell and Molecular Life Scences* 67(15): 2591–603.

Horaček, I. (1995). A total albinism in *Rhinolophus hipposideros*. *Netopiere* 1: 105–106.

Karim, K.B. (1983). A note on an albino *Rousettus leschenaulti*. *Bat Research News* 24: 39–40.

Khajuria, H. (1972). Albinism in the Lesser Rat-tailed Bat, *Rhinopoma hardwickii* Gray (Chiroptera: Rhinopomatidae). *Journal of Bombay Naural History Society* 70: 197.

Khajuria, H. (1984). Notes on some central Indian bats. *Journal of the Zoological Society of India* 36: 125–126.

Leal, E.S. & D.F. Ramalho (2021). First record of albinism in a mustached bat (Chiroptera, Mormoopidae) from South America. *Notassobre Mamíferos Sudamericanos* 3. https://doi.org/10.31687/saremNMS.21.3.1

Leal, E.S., T.C. Lira, A.C. Garcia & M.A. Montes (2021). Albinism in *Artibeus planirostris* (Chiroptera, Phyllostomidae) in the Caatinga biome and updated list of albino bats in Brazil. *Anais da Academia Brasileira de Ciências* 93(4): 1–5. https://doi.org/10.1590/0001-3765202120200582

López-Baucells, A., M. Mas, X. Puig-Montserrat & C. Flaquer (2013). Hypopigmentation in vespertilionid bats: the first record of a leucistic soprano pipistrelle *Pipistrellus pygmaeus*. *Barbastella* 6(1): 63–70.

Lucati F. & A. López-Baucells (2016). Chromatic disorders in bats: A review of pigmentation anomalies and the misuse of terms to describe them. *Mammal Review* 47: 112–123. https://doi.org/10.1111/mam.12083

Mahabal, A., R.M. Sharma, R.N. Patil & S. Jadhav (2019). Colour aberration in Indian mammals: a review from 1886 to 2017. *Journal of Threatened Taxa* 11(6): 13690–13719. https://doi.org/10.11609/jott.3843.11.6.13690-13719

Moreno, C.R., T. Pollock, L. Sánchez & E.C. Mora (2020). Acoustical and morphological comparisons between albino and normally-pigmented Jamaican fruit bats (*Artibeus jamaicensis*). *Caribbean Journal of Science* 50(1): 1–8. https://doi.org/10.18475/cjos.v50i1.a1

Oliveira, H.F. & L.M. Aguiar (2008). A new case of complete albinism in a bat from Brazil. *Chiroptera Neotropical* 14(2): 421–423.

Prevost, O., S. Ducept, M. Gailledrat & N. Tranchant (2011). Apropos d'un Grand rhinolophe albinos dans la Vienne. *Envoldes Chiros* 10: 10.

Raghuram, H., M. Jain & R. Balakrishnan (2014). Species and acoustic diversity of bats in a palaeotropical wet evergreen forest in southern India. *Current Science* 107(4): 631–641.

Redant, B. (2002). A la recherche du Rhino blanc. *Plecotus* 15: 3.

Rocha, P.A., J.A. Feijó, C.R. Donato & S.F. Ferrari. (2013). Leucism in Seba's short-tailed bat, *Carollia perspicillata* (Linnaeus, 1758), from a rock shelter in northeastern Brazil. *Chiroptera Neotropical* 19: 1151–1153.

Romano, M.C., J.I. Maidagan & E.F. Pire (1999). Behavior and demography in an urban colony of *Tadarida brasiliensis* (Chiroptera: Molossidae) in Rosario, Argentina. *Revista de Biología Tropical* 47(4): 1121–1127.

Rook, A., D.S. Wilkinson, F.J.B. Ebling, R.H. Champion & J.L. Burton (1998). *Textbook of Dermatology, 6th ed.* Blackwell Science, Boston, Massachusetts, USA, 3683 pp.

Rydell, J. & J. Eklöf (2003). Vision complements echolocation in an aerial-hawking bat. *Naturwissenschaften* 90: 481–483.

Sánchez-Hernández, C., M.D.L. Romero-Almaraz, A. Taboada Salgado, A. Almazán-Catalán, G.D. Schnell & L.S. Vázquez (2010). Five albino bats from Guerrero and Colima, Mexico. *Chiroptera Neotropical* 16: 522–527.

Sawada, I. (1990). On the distribution of cave bats and their endoparasite fauna on the Iki Island in Nagasaki Prefecture. Trans. *Nagasaki Biological Society* 36: 17–21 (in Japanese with English summary).

Senacha, K.R. & A. Purohit (2005). Partial albinism in the lesser mouse-tailed bat, *Rhinopoma hardwickii*. *Bat Research News* 46: 75–76.

Singh, P. & M.K. Yadav (2016). Observation of albino *Rhinopoma hardwickii* in Bikaner, Rajasthan, India. *Vespertilio* 18: 169–170.

Srinivasulu, A., B. Srinivasulu, T. Kusuminda, C. Amarasinghe, K.D. Ukuwela, M. Karunarathna, A. Mannakkara, W.B. Yapa, C. Srinivasulu (2023). Taxonomic status of the Lesser Woolly Horseshoe bats (Chiroptera, Rhinolophidae, *Rhinolophus beddomei*) in peninsular India and Sri Lanka. *Zootaxa* 5301(2): 199–218. https://doi.org/10.11646/zootaxa.5301.2.3

Srinivasulu, C., P.A. Racey & S. Mistry (2010). A key to the bats (Mammalia: Chiroptera) of South Asia. *Journal of Threatened Taxa* 2(7): 1001–1076. https://doi.org/10.11609/JoTT.o2352.1001-76

Stevens, G., M. Ramsay & T. Jenkins (1997). Oculocutaneous albinism (OCA2) in sub-Saharan Africa: distribution of the common 2.7- kb P gene deletion mutation. *Human Genetics* 99: 523–527.

Talerico, J.M., T.S. Jung, R.M.R Barclay & K.S. Melton (2008). Aberrant coloration in a little brown bat (*Myotis lucifugus*) from the Yukon. *Northwestern Naturalist* 89: 198–200.

Tello, C., D.G. Streicker, J. Gomez & P.M. Velazco (2014). New records of pigmentation disorders in molossid and phyllostomid (Chiroptera) bats from Peru. *Mammalia* 78: 191–197.

Uieda, W. (2000). A review of complete albinism in bats with five new cases from Brazil. *Acta Chiropterologica* 2: 97–105.

van Grouw, H. (2006). Not every white bird is an albino: sense and nonsense about colour aberrations in birds. *Dutch Birding* 28: 79–89.

van Grouw, H. (2013). What colour is that bird? The causes and recognition of common colour aberrations in birds. *British Birds* 106: 17–29.

Ventorin, M.L., B.M. Dell' Antonio, J.P.M. Hoppe & A.D. Ditchfield (2021). First record of albinism in *Artibeus obscurus* (Chiroptera: Phyllostomidae) in an Atlantic Forest area. *Notassobre Mamíferos Sudamericanos* 3: 2–9. https://doi.org/10.31687/saremNMS.21.1.2

Wordley, C.F.R., E.K. Foui, D. Mudappa, M. Sankaran & J.D. Altringham (2014). Acoustic identification of bats in the southern Western Ghats, India. *Acta Chiropterologica* 16(1): 213–222. https://doi.org/10.3161/150811014X683408

Zortea, M. & M.C. Silva (2017). Albinism in the striped spear-nosed bat *Gardnerycteris crenulatum* (Chiroptera: Phyllostomidae) with an updated list of albino bats in the World. *Mammalia* 82(1): 78–84. https://doi.org/10.1515/mammalia-2016-0080

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