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Contents

Funguy

Termitomyces, A unique mushroom of the Rain Forests
-- Anurag Goel & Sujata Goel, Pp. 01–03

Mammal Tales

Distribution record of Yellow-throated Marten from Rani-Garbhangra Reserve Forest, Assam, India
-- Ranjit Kakati, Dils Joree & Dipankar Borah, Pp. 04–05

First record of melanism in Rhesus Macaque from India
-- Gaurav Barhadiya, Pp. 06–07

Photographic evidence of albino Sambar in Uttarakhand, India
-- Shariq Shafi, Meraj Anwar & Rahul Singh, Pp. 08–10

Land of Rhinos - a chronicle
-- Sarbasis Dutta, Pp. 11–14

Cost colour variation in Common Palm Civet in Satkosia, eastern India calls for the need to revisit taxonomic and distribution status
-- Vaishali Vasudeva, Gatikrishna Behera, Subhendu Prasad Behera, Saroj Kumar Panda, P. Ramasamy, Pradeep Raj Karat, Sandeep K. Gupta & K. Ramesh, Pp. 15–17

SMALL MAMMAL MAIL

Training and demonstration on bat detector
-- Prabhat Kiran Bhattarai, Pp. 18–21

REPTILE RAP

Record of albino Indian Flapshell Turtle from Pune, Maharashtra, India
-- Umesh Vaghela & Rajendra Kamble, Pp. 22–23

Plantasia

The central American Tiger Lily, an invasive plant in and around Jalapahar-Cantonment Forest of Darjeeling Himalaya, India
-- Subhasis Panda & Leo Chhetri, Pp. 24–27

Vet Brief

Chemical immobilization of an injured Himalayan Ibex with Ketamine-Xylazine mixture
-- Animesh Talukdar & Pankaj Raina, Pp. 28–30

Bird-o-soar

Report of partially leucistic Lesser Whistling-Duck from West Bengal, India
-- Debayan Gayen, Subhadeep Saha & Sagar Adhurya, Pp. 31–33

Who will eat this gecko? A pair of Indian Grey Hornbills!
-- Pratik Desai, Purva Mhatre, Divyajit Kaur Bal & Nishith Dharaia, Pp. 34–36

First record of Bristled Grassbird from Paschim Bardhaman District, West Bengal
-- Sagar Adhurya, Sankha Misra, Sumit Kayal & Koushik Pan, Pp. 37–40

Termitomyces, A unique mushroom of the Rain Forests

During the damp days following the monsoon showers, one can often see wild mushrooms spring up in the undergrowth of the forested valleys where we live. Locally, people share a great interest in these mushrooms as they provide nutritious and delicious source of food, and are also coveted for their medicinal value.

A few weeks ago, hidden within the leaf litter, we found little white balls moving around on the forest floor. Upon a closer look, these were being brought to the surface through channels in the soil by termites. One by one, the termites brought these tiny balls, which we later realized were compact mycelium balls, and pushed them to the surface. Overnight, these grew from a few to several



Termites bring mycelial nodules 'mycotetes' to the surface.



Mushrooms emerge from the mycelial nodules.



Mycotetes grow in numbers overnight and keep growing as termites continue to bring them to the surface.



Closeup of the mushrooms.

hundreds, and then within the next 24 hours, there were patches all over the ground. The next day, most of these balls sent a stem up and each stem opened into a mushroom umbrella! We had discovered what is known as *Termitomyces microcarpa*, a small wonderfully tasty mushroom, which is intrinsically linked to termite mounds.

Termitomyces is a mushroom farmed by termites. It belongs to the family Lyophyllaceae, and occurs both in Asia and Africa. The termites, called *Macrotermes*, belonging to the subfamily Macrotermitinae are characterized by their symbiosis with *Termitomyces*. The fungi are unique in being able to grow only in symbiotic association with termites which cultivate them on semi- digested organic matter that they bring back to their nests from feeding on decaying trees. On

their own, the termites lack the enzymes to completely digest the plant matter. The fungi, being saprophytic, secrete enzymes which degrade cellulose and lignin, components of the dried or decaying plant matter on which termites live. Fungal-decomposition of the organic matter results in a food rich in nitrogen and phosphorus, both essential for the well-being of the termites.

Termites farm the mushrooms on terraces inside their 'termite hills' which is visible as a mound above ground and can reach to depths of 1–3 m. The tunneling can expand over vast areas, and the mushroom terraces or 'combs' fill these spaces as the colony grows. The mycelium makes little nodules called 'mycotetes', which are enriched in minerals and nutrients, and these are what the termites feed on. Finally, with the onset of the rains and building up of humidity, the mycelial nodules are carried up one at a time by the termites to the surface. These grow into mushrooms overnight, and the fungus is able spread across wider areas through its spores. It is the mutualism that enables the survival, evolution and spread of both, the termites and the mushrooms.

Over twenty edible species of *Termitomyces* have been recorded across Asia and Africa and vary in size from the smallest caps of 2 cm found in *T. microcarpa* to those with the largest caps measuring 1

m in *T. titanicus*. These are collected and sold for their nutritional and medicinal value. *Termitomyces macrocarpa* has also been found to be a source of ergostanes which show promising cytotoxicity against cancer cell lines. Together, the termites and fungi have created a powerful example of mutualistic survival.

This observation was at the Rainforest Retreat in Coorg. The mushrooms are quite well known locally and called 'Nuchhi kumm'.

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Distribution record of Yellow-throated Marten from Rani-Garbhangha Reserve Forest, Assam, India

The Yellow-throated Marten *Martes flavigula* Boddaert 1785 (Mammalia: Carnivora: Mustelidae) is a wide-ranging carnivore distributed from Pakistan and Afghanistan in the west to far east Russia, and Indonesia in the east (Corbett & Hill 1992). In India, the Yellow-throated Marten is distributed in the forested regions of western and eastern Himalaya from Kashmir to Arunachal Pradesh, chiefly in the valleys at high and moderate elevations (Bahuguna & Mallick 2010). Its occurrence in the entire Kanchenjunga transboundary conservation landscape (eastern Nepal, western Bhutan, Sikkim and Darjeeling in India) has been reported by Chettri & Sharma (2006). It is also recorded from West Bengal (Srinivasulu & Srinivasulu 2012), Nagaland (Choudhury 2000), and Manipur (Ramakantha 1994), Garo Hills as well as in Balpakram National Park of Meghalaya (Kumar et al. 2002). In Assam, a handful records can be seen on the



Yellow-throated Marten *Martes flavigula* in Rani-Garbhangha Reserve Forest, Assam, India. © Ranjit Kakati.

India Biodiversity Portal (Vijay Anand Ismavel on 1 April 2012 from Karimganj District, Assam; Jitendra Kumar Sarmah on 31 March 2018 from Bhimashankar Road, Pamohi, Guwahati, Assam and another one by Tanbeer Ahmed on 09 August 2020 at Manas National Park, Assam). However, no record of it are there from Rani-Garbhangha Reserve, which hosts an unique assemblage of wildlife and habitat in western Assam. We observed this species during a visit to the Kopili River of Rani-Garbhangha Reserve Forest on 21 March

2017. While walking along a trail on the sides of a stream, seven individuals of Yellow-throated Marten were spotted. The Martens were divided into two groups, one consisting of five individuals and the other consisted of two individuals. The vegetation was dense and dominated by bamboos but the Yellow-throated Martens could be easily distinguished because of their bright yellow colour. One group (five individuals) was very close to the stream, foraging and the second group (two individuals) were up on a hill nearby. The two

groups were observed for about an hour after which they left the riverside and disappeared into the undergrowth. Still photographs, videos and indirect shreds of evidence were collected.

According to IUCN, the Yellow-throated Marten is abundant and widespread throughout its range but no overall population estimate is available. Currently, this species is classified as Least Concern (LC) on the IUCN Red List but its numbers today are decreasing.

Detection of the shy and elusive Yellow-throated Marten in the field is rare because of vegetation density at the understorey level. However, if sighted, this larger Marten is sharply differentiated from the smaller Beech Marten by contrasting marks of the larger head and throat, unique blend of black, white, golden-yellow and brown, relatively short fur and a longer tail (Mallick 2015).

Yellow-throated Marten is mostly diurnal in the undisturbed forests but becomes nocturnal near the human habitations. They mark their range with feces and urine and often defecates in the open areas and prominent places like stone. It is predominantly a carnivore preying on the smaller ungulates, primates, rodents, reptiles, and birds. It forages for fruits in trees in both the lower and upper reaches of the canopy and on the ground (Mallick 2015). More scientific investigation including monitoring of the habitats of Yellow-throated Marten in the entire Assam area is necessary to know more about its ecological significance and conservational threats to this overlooked species.

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First record of melanism in Rhesus Macaque from India



Rhesus Macaque *Macaca mulatta* (Zimmermann, 1780) is the most widespread of all Indian primates. They live in close association with humans and use a quite diverse habitat like temple surrounds, urban areas, rural areas, pond side, roadsides, and forests. They are brown in colour with fur varying from very thick and dark in Kashmir to sparse sandy brown in Rajasthan, the orangish tint to the fur on the hindquarters is also present and is constant (Menon 2014).

Light to dark coat colour variation is a common aspect of colour diversity within and across mammalian taxa but very little is known about the genetic mechanisms underlying light and dark differences in pelage pigmentation in mammals (Bradley et al. 2013). Melanism is a condition when there is an increased amount of black or nearly black pigmentation of melanin (on skin, feathers or hairs) of an individual (Lucati & Lopez-Baucells 2017; Mahabal et al. 2016).

During a field survey on 16 February 2019 at 1224 h, I recorded and photographed a young melanistic individual (Image 1a,b) of Rhesus Macaque along with normal coloured adult in an Assam temple, popularly known as monkey temple in the district of North Lakhimpur of Assam



Image 1a&b. The melanistic individual of Rhesus Macaque at the Monkey Temple in Assam, India.
© Gaurav Barhadiya.

(27.0022°N, 93.9842°E). This melanistic female individual was found sitting near the temple boundaries with three other males. As soon I went a little close to get some more photographs the troop started running towards the forest patch behind the temple.

The information and records of melanism in Rhesus Macaque is extremely scanty. While going through literature, we find considerable reported cases of albinism (Bahadur 1942; Singh & Mohnot 2009; Mahabal et al. 2019) from India. But we could not find any reported case of melanism in Rhesus Macaque from India. To the best of our knowledge, this is the first record of melanism in Rhesus Macaque *Macaca mulatta* from India.

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Photographic evidence of albino Sambar in Uttarakhand, India

Albinism is typically a recessive trait found in many animals including mammals, birds, reptiles, amphibians and fish. Albino animals do not have the gene for normal colouration and do not produce the enzyme responsible for skin, hair, and tissue colouration (Fertl & Rosel 2009). The coloration of skin, hair, and eye mainly depends on the quantity, quality, and distribution of the pigment called melanin (Fertl & Rosel 2009). Alterations or mutations in the gene can result in a deficiency or decrease of melanin (Acevedo & Aguayo 2008). Such conditions have been categorized as albinism (total absence of body, hair and eye coloration), leucism (total or partial absence of pigmentation in whole body except for the eyes), and piebaldism which is a condition characterized by absence of melanocytes in certain areas of the body and normal eye colouration (Fertl & Rosel 2009; Mahabal et al. 2019).



Albino Sambar in Pakhro Range of Sonanadi Wildlife Sanctuary on 19 March 2020. © Corbett TR & WWF-India.



Albino Sambar in Pakhro Range of Sonanadi Wildlife Sanctuary with normal colour individual in the back. © Corbett TR & WWF-India.

Even though the colour aberration has been reported in many species, these events

are still considered to be rare. In India, the only detailed work on colour aberration

in mammals was carried out by Mahabal et al. (2019), who compiled a checklist of all reported cases of colour abnormalities across the country. A total of 239 cases of colour aberration (albinism, leucism, piebaldism, melanism, & hypomelanism) over a period of 130 years have been reported in as many as 56 mammalian species such as Tiger *Panthera tigris*, Leopard *Panthera pardus*, Golden Jackal *Canis aureus*, Asian Elephant *Elephas maximus*, Sloth Bear *Melursus ursinus*, Sambar *Rusa unicolor*, Spotted Deer *Axis axis*, Hog Deer *Axis porcinus*, Nilgai *Boselaphus tragocamelus*, and Gaur *Bos gaurus* (Mahabal et al. 2019) as well as in avian species such as Rose-ringed Parakeet *Psittacula krameri* and House Crow *Corvus splendens* (Mahabal et al. 2015).

One such event of albinism in Sambar recorded in the camera trap from Sonanadi Wildlife Sanctuary (SWS) of Corbett Tiger Reserve (CTR) in the state of Uttarakhand, India. These are the first photographic evidence of the albinism in Sambar from SWS and second from CTR. Spread over 1,288 km², the CTR is managed into two protected areas (PAs) namely Corbett National Park (CNP) and SWS. Administratively, the CTR comes under the Nainital and Pauri districts in the foothills of Himalaya. Camera traps were deployed in a grid framework of 2 km² size, primarily for the yearly monitoring of the tigers across the CTR. Study was carried out between 1 December 2019 and 30 April 2020. A total of 525 pairs of camera traps were kept operational 24x7 into different terrain and habitat types and altitude ranging 270–1,200 m in the entire

TR. On 19 March 2020 at 1819 h, an adult female Sambar with completely white body coat and pinkish ears and eyes was photo-captured in Pakhro Range of SWS (Camera ID CTR 518, 29.621°N, 78.694°E, alt 376 m). Camera trap recorded five multi-shot images of the same albino individual within a span of two minutes. In one of these consecutive images, another individual with normal colour coat was also recorded along with albino Sambar. Rarity of sighting of albino Sambar in the CTR could be understood well as such individual recorded only once in an effort of more than 25,000 trap nights.

Ten years ago, an albino fawn of the Sambar also sighted (at 452 m) and photographed by Pande et al. (2010) in the National Park side of the CTR, and that sighting occurred roughly 27 km away from the location of the present record. A very few instances of colour aberrations in Sambar have been highlighted from various parts of India so far (Mahabal et al. 2019). However, pelage aberrations in Sambar other than albinism include leucism and partly leucism with normal eyes, which has been documented by Tehsin (2006) in an individual kept in Archaeological Museum of Udaipur and by Kumar et al. (2021) in Mukurti National Park, Tamil Nadu. Champion (1938) reported an albino individual in mixed Sal and Chir pine forest near Lansdowne, Uttarakhand at an elevation of 457 m, while Pillay (1953) claimed sighting of two albino individuals in northern Coimbatore. Mahabal et al. (2019) cited the reporting of an albino Sambar at Manipur Zoological Garden and in Bandipur Tiger Reserve in 2010 and 2016, respectively.

Recently, The Times of India on 14 Jan 2020 (<https://timesofindia.indiatimes.com/city/nagpur/albino-sambar-sighted-in-navegaon-national-park/articleshow/73235410.cms>) and The Hindu newspapers on 15 June 2020 (<https://www.thehindu.com/news/national/tamil-nadu/biologists-flag-mutation-in-nilgiris-wildlife/article31829361.ece>) had also published the records of albinism in Sambar from Navegaon National Park, Maharashtra and Nilgiris Reserve, respectively.

In both of the reports from CTR, albino animals were accompanied with other Sambar having normal colour coat and provides information about social acceptance among the members of the herd. No abnormal behaviour of the albino Sambar along with other individuals seen in the photographs taken by camera trap. Information on their social behaviour with in the herd and predator-prey relationships of such albino individuals is scanty in the available literature. Therefore, radio tracking of such animals will surely add information to the science on these issues. Genetic study of albino animals may answer the cause of aberrations in their colour coat.

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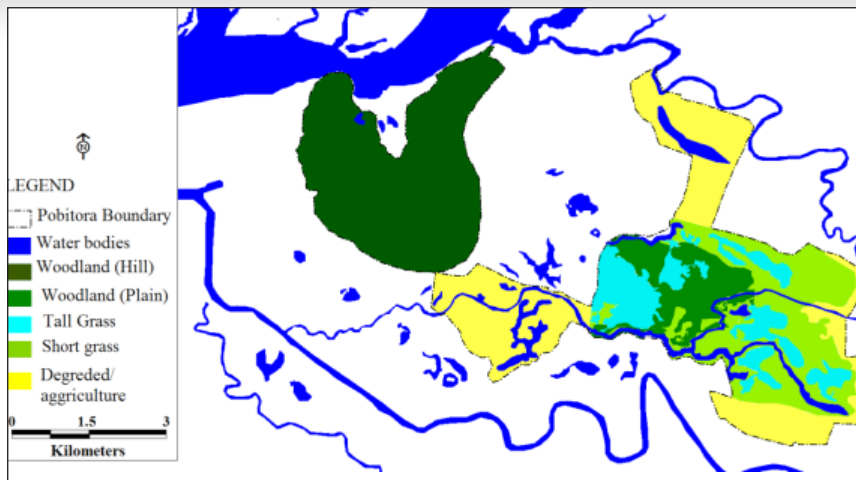
Land of Rhinos - a chronicle

Pobitora in Assam is a small sanctuary which houses the peak density of wild Greater One-horned Rhinoceros *Rhinoceros unicornis* in the world. As the sanctuary is encircled by villages on all sides, it has very little scope for expansion (Bhatta 2011). Though declared a sanctuary in 1987, it has a decidedly leaky boundary, with cattle, wood cutters, and herdsmen freely moving in and out of the area (Bhatta & Kumar 2011).

During specific festivals, throngs of villagers encroach into the sanctuary and fish indiscriminately in the wetlands, driving away the resident animals. Wild Rhinos often move outside the sanctuary and enter human habitats in search of food leading to serious man-animal conflict (Bhatta 2011).

The muggy grasslands, interspersed with woodlands and wetlands, make Pobitora the perfect habitat for the Greater One-horned Rhino (Saikia 2019). The park's





Map of Pobitora Wildlife Sanctuary (from Ramesh & Kumar 2011).

growing Rhino population was observed while conducting survey on foot, where Rhinos with their infants were sighted quite frequently even though the resources available for their survival appeared to be extremely limited. After interactions with forest officials regarding the growing overpopulation of Greater One-horned Rhinos, the fierce competition among the animals for food, space, shelter, and mates emerged as some of the leading causes of concern in the sanctuary. It could lead to inbreeding depression of this endangered species (Sinha et al 2011).

While conducting intensive survey on grass birds inside the sanctuary, frequent sightings of Rhinos along with the bird species

nestled inside the grass tussocks, was a rewarding and fulfilling experience. Forest range officers of the sanctuary arranged for two experienced armed forest guards to accompany us, who were extremely passionate about their work and regaled us with stories of their experiences, which provided us with immensely valuable insights about Rhinos and their habitats. One of the major concerns was the extensive cattle grazing inside the sanctuary from the encircling villages which invades the Rhino territories, leaving the pachyderms to scrounge for food, making them predisposed to diseases (Bhatta 2011).

While a major portion of the grass collected by the local villagers is used as fodder

for cattle. They also end up destroying a huge amount of grass by burning it improperly during collection of thatch which essentially creates the shortage of food inside the sanctuary. We also observed the invasion of weeds, which can be a dominant threat to the grassland which debases its quality as available fodder for Indian Rhinos (Saikia 2019). Straying of Rhinos out of the sanctuary in search of food, to private agricultural areas, scrub areas, and floodplains of the river Brahmaputra has become the prevalent norm (Bhatta 2011). Another important observation was that the Rhinos at Pobitora showed inadequate reaction when approached by tourists, protection staff or researchers as compared to other protected areas of Assam, which can be the result of the regular ongoing anthropogenic interferences in the sanctuary.

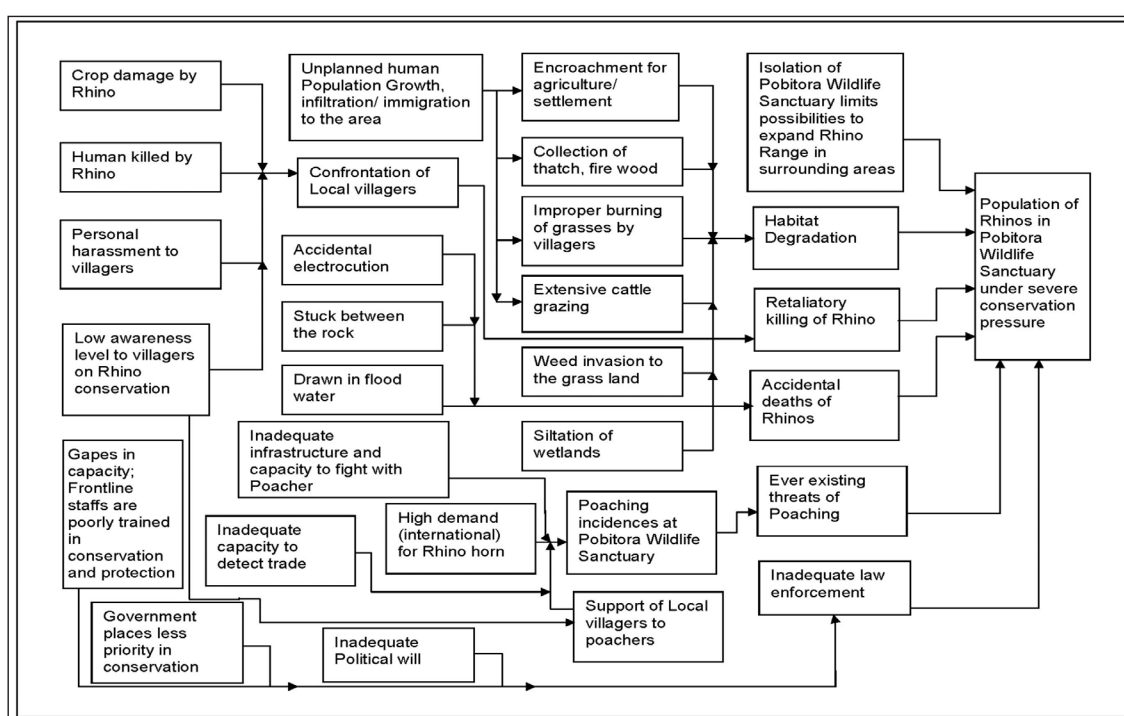
From interaction with forest officials, we came to know that around 10 km² area was found to be used by local villagers for agriculture. Intensive agricultural practices just adjacent to the border had also affected the habitat

and the behaviour of wild animals including Rhinos (Sinha et al. 2011). After construction of PWD roads, the process of siltation of wetlands was found to be accelerated without sufficient water channels (Sinha et al. 2011). Expansion of woodland towards grassland habitat was also found to be common in the sanctuary which had endangered the grassland habitat. Poaching of Rhinos for horn was common in the sanctuary (Sinha et al. 2011). The main modes of poaching were recorded as electrocution, bullet injury, and poisoning (Sinha et al. 2011). Forest guards are given permission to shoot at sight and during

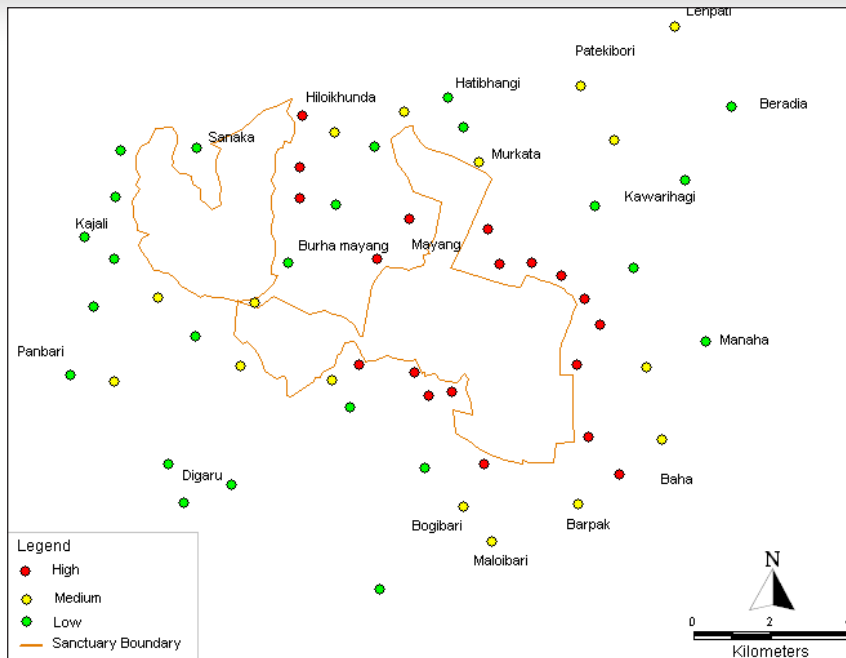
the survey in the sanctuary, they showed us some areas where they had encountered poachers and were forced to take extreme measures like shots fired in their direction to control the situation at hand. They also informed us that in order to further contest the poaching incidents in the sanctuary and keep a check on the conflict, use of unmanned aerial vehicles (UAVs) can be an immensely useful technique for the forest department officials. With the help of UAV's, they managed to cover great distances in the conflict area in order to remotely identify the site of the 'problem animal'. This helps them to

strategize procedures for tranquilizing and rescuing affected Rhinos, without risking any casualties.

As the forest guards were so amicable, I contacted them after the protracted flood of Assam in 2020, which had washed away the huge grasslands and swamped 70 % of the forest, leading to a food scarcity for the animals. Rhinos turned nomadic and entered human habitats in search of sustenance leading the forest department to face a complicated situation. They arranged for boats loaded with fresh grass to transport to the highlands inside the park in order to deliver



Threats and pressures on survival of Indian Rhino in Pobitora Wildlife Sanctuary (Bhatta 2011).



Distribution of Rhino-affected villages around Pobitora Wildlife Sanctuary (Bhatta 2011).

fodder to the marooned Rhinos of the sanctuary. It was also very surprising to learn that for the very first time, a Rhino mother and her calf came up to 10 feet distance from their doorstep due to the ceaseless rains, while grazing on overgrown grasses near the base camp.

Pobitora Wildlife Sanctuary is home to around 102 Endangered Greater One-horned Rhinos according to the last census carried out at the end of 2018. After completion of our survey in the sanctuary, I had a detailed discussion with the range officer where we came to the conclusion that in order to manage the

population of Rhinos and protect the small isolated area, there is an urgent need for applied research through collaborations between social scientists and ecologists, who can help people understand the diverse rudiments of human-wildlife interactions. This can be helpful to conserve the Rhinos and assure the wellbeing of the neighbouring people at the same time. Additionally, rules need to be enforced strictly and alternative means of grazing should be provided to villagers before it causes irreparable damage. This could amplify enthusiasm to conserve the Rhinos and their habitats

rather than destroying them through burning, over-grazing, and agriculture. The present is the perfect time to practice some new-fangled ways to assimilate economic development hand in hand with conservation.

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Coat colour variation in Common Palm Civet in Satkosia, eastern India calls for the need to revisit taxonomic and distribution status

Aberrant colouration has been reported widely in pelage of mammals and can vary due to environmental and geographical variations (Taylor et al. 1990). While it is known that the aberration is due to genetic mutations affecting the melanin metabolic pathway, the exact mutation responsible cannot be confirmed by limited visual observations of phenotype in wild individuals. The extent and appearance of albinism varies and can be broadly described as complete albinism or leucism or partial albinism.

Three species are defined within the genus *Paradoxurus* (Cuvier, 1821), one of which is the Common Palm Civet *Paradoxurus hermaphroditus* (Pallas, 1777), also known as Asian Palm Civet or Indian Palm Civet. It is a small mammal belonging to the family Viverridae. It is distributed in southern and southeastern Asia (Patou et al. 2010; Veron et al. 2015). Coat colour variations have been described within



Image 1. (A) Photograph of partial albino individual of common palm civet captured in camera trap on 13 March 2020 at 2057 hours in Satkosia Tiger Reserve. (B) Photograph of partial albino individual showing unpigmented fur in band like pattern, captured on 19 May 2020 at 0012 hours in Satkosia Tiger Reserve. (C) Photograph of normal coat colour individual of common palm civet (captured in the same area as (A) on 14 April 2020 at 0311 hours. © K. Ramesh/WII/Odisha Forest Department.

Paradoxurus hermaphroditus based on the specimens collected from eastern India and also used as a basis to provisionally describe sub-species (*nictitatus*) and new species (*jorandensis*) (Taylor 1891; Pocock 1934; Ali et al. 1988). Coat colour variation in Common Palm Civet has been previously reported by Sharma (2004) and Chuneekar et al. (2017). We report the partially albinistic individuals

of Common Palm Civet, photo-captured in Satkosia Tiger Reserve.

Satkosia Tiger Reserve (946 km²) is located in Odisha, India (Figure 1). The vegetation of Satkosia largely conforms to north Indian moist deciduous forest, northern tropical dry deciduous forest, and moist peninsular low-level Sal. Terrain is undulating

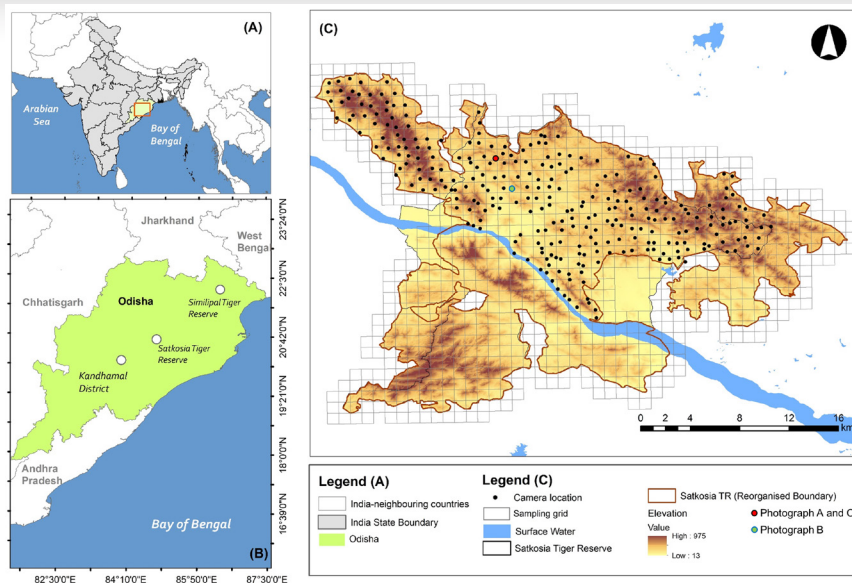


Figure 1. Map showing (A) location of Satkosia Tiger Reserve in India, and (B) in Odisha (C) Location of camera traps and sightings.

to hilly with maximum elevation of 992 m (Figure 1). Temperature varies from 4 to 48 °C. Climate is warm and humid with short winters.

The photographs were captured in the camera traps that were installed within a 2-km² sampling grid to monitor tiger movement and prey distribution. The cameras were deployed on trees, at a height of approximately 1 m, with a delay of 10 seconds and medium flash intensity, for a duration of 45 days. Systematic monitoring in Satkosia Tiger Reserve was being carried out since May 2018, but it was mainly focussed on the eastern part of the reserve. The western part of the reserve that

concerns this study was surveyed for the first time since 2018. No repeat sightings had been observed in other parts of the reserve.

The photograph of a partial albino individual of Common Palm Civet was captured at two locations in Majhipada Reserve Forest in Satkosia Wildlife Division (20.6953° N, 84.7669° E) (Figure 1). It has dry deciduous forest mainly comprising of *Sal Shorea robusta*, *Dhaura Anogeissus latifolia*, *Karada Cleistanthus collinus* and *Asana Terminalia arjuna*. The elevation ranges between 200 and 350 m and has a gentle slope of less than 10 degrees. The photograph (Image 1A) was captured on 13 March 2020 at 2057 h and shows that the

body below the shoulders has creamish-whitish fur, without any visible marks or spots. Similarly, tails and legs lack any pattern or pigmentation. The fur is pigmented only behind the ears and near eyes and close to the muzzle. White patches on the head below eyes are distinctly visible. Around the same area (Figure 1), we recorded another individual having unpigmented (creamish) band of fur near abdomen and the middle section of the tail (Image 1B). Image 1C shows an individual with normal coat colour and was captured in the same camera on 14 April 2020. It shows distinct markings as described for *Paradoxurus hermaphroditus* (Pocock, 1939). Pocock (1939) described the coat in species *hermaphroditus* has longitudinal stripes on the back, spots on the sides, shoulders, and thighs. White patches occur on head on a black ground, on each side of muzzle, and also below the eye (subocular). Veron et al. (2015) observed variation in the face pattern in specimens from northern India having a white patch. Some rare specimens collected previously from Kandhamal (Kondamal or lower Bengal

of pre-independence India) (Figure 1) have been observed to have only the head and shoulders normally coloured and rest of the body is white. Taylor (1891) described it as partial albinism and as subspecies *nictitans* (similar to the pattern in Image 1A). Two other specimens from this region having broad band of white fur and some parts of tail as white were admitted as potentially different race due to limited specimen availability by Pocock (1939). Similar observations were made by Ali et al. (1988) in specimens collected near Similipal Tiger Reserve, Odisha (Figure 1) and the type of coat pattern was described as a new species *Paradoxurus jorandensis*. While there is no molecular evidence to support splitting of the species, our findings (Image 1B) suggest distribution of this particular coat pattern beyond Similipal region.

Conclusion regarding the exact genetic mutation causing this phenotype cannot be made without conducting a genetic analysis. This could possibly be described as leucism or partial albinism based on the limited photographic observation of pelage. Veron et al. (2015) have suggested possibility of at least two sub-species within the Indian region. Since coat colour variations are often influenced by climate and geography, further investigation using both morphologic (and pelagic) characteristics and molecular data are suggested. Therefore, a study that incorporates samples/specimens from Indian region specifically from eastern India is required to validate the existence of sub-species within *Paradoxurus hermaphroditus*, which has been lacking in earlier studies (Patou et al. 2010; Veron et al. 2015).

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Training and demonstration on bat detector

On 17 April 2019, 'Training and Demonstration on Bat Detector' was organized by Bat Friends Pokhara at Bat Cave, Pokhara Metropolitan city-16, Batulechaur. The programme was scheduled on the fourth day of National Wildlife Week celebrated on every first week of Nepalese New Year.

It aimed to familiarize the use of bat detectors among young undergraduate students from Institute of Forestry, Tribhuvan University, Pokhara campus. Nepal harbours 53 species of bats with high potentiality of new records (Acharya et al. 2010; Thapa 2014).

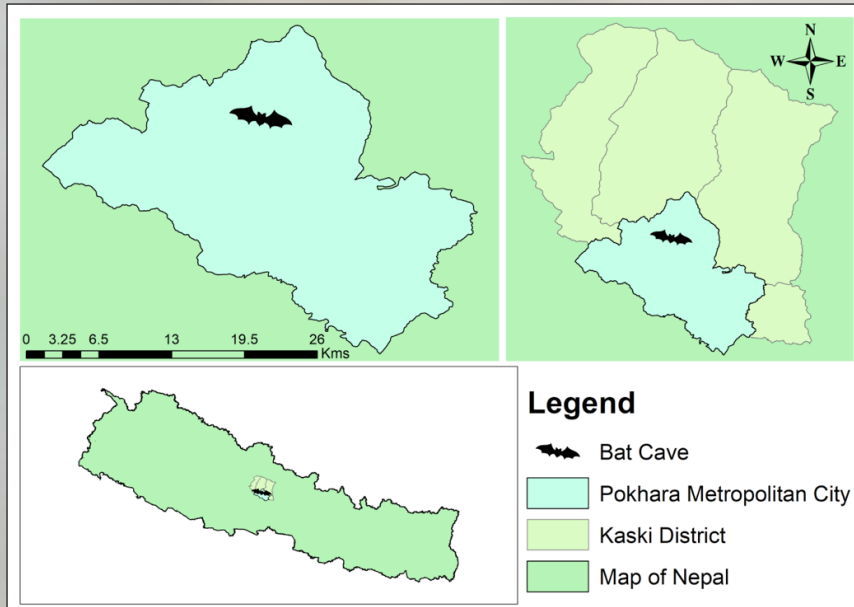
All bats except flying fox species (Family *Pteropodidae*) are laryngeal echolocators that navigate in the dark with the help of echolocation calls (Jones & Holderied 2007). Echolocation calls may be constant or frequency modulated signals given out by bats whose value is unique for each species.



Hipposideros armiger. © Sirish Dangi.



Inauguration of the programme. © Sirish Dangi.



Chamere Gufa (Bat Cave) located at Pokhara Metropolitan city, ward number 16, Batulechaur.



Organizer with a bat detector. © Sirish Dangi.

Most of the Nepalese bat species has been captured and identified with the help of mist nets and harp traps, a very stressful process to these creatures. However, very few surveys are conducted with bat detectors in Nepal. Bat detectors can be used to

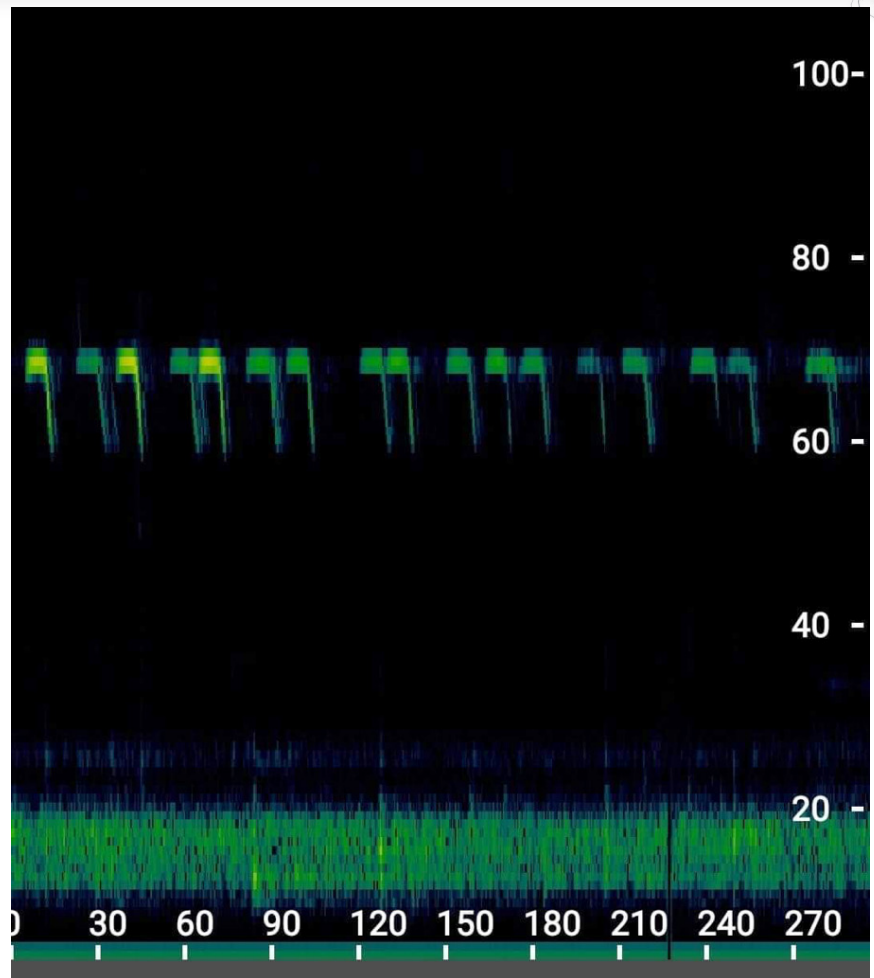
reveal presence, investigate behaviours, estimate and monitor the population trend of bats (Russo & Voigt 2016). Hence, the training was organized with a motto to encourage young students towards research on bats and acoustic surveys.

Bat Friends Pokhara, a membership-based green organization at Institute of Forestry, Pokhara is concerned on bat research, conservation, and awareness. It was established in 2006 by a group of students with keen interests on bats. Since then, it has been actively involved in various trainings and research works (Adhikari et al. 2008; Adhikari & Mohan 2008; Bist 2010; Bhattarai 2019; Bhattarai et al. 2021). Bat cave is one of the best show caves of Pokhara valley. It is managed by Shree Vindhya Vasini Secondary School, Pokhara 16, Batulechaur. Two species, *Rhinolophus luctus* and *Hipposideros armiger* are recorded from this cave including hibernating colony of *H. armiger* during winter (Baniya 2018). Bats migrate to nearby Mahendra cave for maternity roosting after hibernation.

The program was inaugurated at 1145 h by Mr. Sishir Poudel, a representative from the cave management committee. Altogether, 60 students participated in the programme. Participants were orally taught on bat



echolocation phenomenon outside the cave after formal inauguration of the program. A bat detector, Echo Metre Touch 2 Pro device was mounted on an Android device and operated by mobile application Echo Meter to record echolocation calls. Students were divided into three different groups and bat detector usage process through android application was demonstrated. Echolocation call recording procedure and species identification from echolocation diagrams were validated to the participants with the help of previously recorded samples.



Call frequency of *Hipposideros armiger*.

After theoretical demonstration, each group was allowed inside the cave one at a time. They were provided with a detector to record echolocation calls. Only one bat species was recorded with the call frequency of 68–70 kHz. The species was confirmed to be *Hipposideros armiger*. Since their hibernation period had ended, only about 300 individuals were observed roosting inside the cave. This programme maybe one of the pioneer bat detector trainings



Participants discussing on the echolocation call. © Sirish Dangi.



in Nepal. The training was highly interactive and participants were curious to learn more about bats and acoustic surveys.

We are grateful to all the participants and volunteers for effective and interactive participation. We would like to acknowledge National Wildlife Week Committee-2076, IOF for providing the opportunity; the cave management committee for coordination and permission throughout the program and Institute of Forestry, Pokhara campus for their continuous support and assistance.

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Record of albino Indian Flapshell Turtle from Pune, Maharashtra, India

The Indian Flapshell Turtle *Lissemys punctata* (Bonnaterre, 1789) is a soft-shell turtle belonging to the family Trionychidae of the order Testudines. It is a freshwater turtle and found in ponds, rivers, and lakes all across India and also distributed in other parts of the Indian subcontinent. It is an omnivore that feeds mainly on aquatic vegetation, plant leaves, fruits, and small aquatic animals (Bhupathy et al. 2014). The Indian Flapshell Turtle is protected under Schedule I Part II of Indian Wildlife (Protection) Act, 1972 as amended up to 2013 (WLPA 2013).

On 28 July 2019 at 1230 h, a school student Master Vinayak Lokhande located a turtle on the side of a runnel near Aundh Chowk (18.562°N & 73.828°E), Pune, Maharashtra. The runnel is a tributary of 'Mula' River which flows through the Pune City. Being a bright off-white color, it caught the boy's attention and he informed us (ALIVE - UV & RK) about the turtle, as we are working for nature conservation through our non-government organization. After reaching there, we closely observed the live turtle and took photographs of it for further studies. Its carapace was depressed and oval in shape like in adults. Femoral flaps on plastron were intact. Limbs and forehead not scaled. Three clawed fore and hind limbs (webbed). Lack of scutes on the shell and carapace was covered with skin. From the key characters



Albino Indian Flapshell Turtle *Lissemys punctata* from Pune, Maharashtra. © Rajendra Kamble.

like femoral flaps, nasal septal ridges and shell closure mechanism, we confirm it as Indian Flapshell Turtle (Webb 1982; Sharma 1998; Hanfee 1999).

The turtle was an albino as the whole body colour was off white or yellowish in colour and both of its eyes were red in colour. There were not any dark pigmentation patches or spots on carapace, plastron, limbs, head, neck or any part of its body. Subsequently,



we informed about the observation of albino turtle to the Forest Department of Maharashtra, Pune Division.

Albinism is a congenital disorder and it is characterized by lack of melanin pigment (Rufus 2009). In general, it is well known that albinism can occur for a number of reasons aside from inheritance, including genetic mutations, diet, living conditions, age, disease or injury. Albinism can be seen rarely in many animal species. Albinism can reduce the survivability of an animal due to the lack of protection from UV rays and lack of camouflage to avoid predators.

The perusal of literature revealed a few instances of albino Indian Flapshell Turtle reported from Nagpur, Maharashtra (D'Abreu 1928), Himmatnagar, Gujarat (Vyas 1997), Chennai, Tamil Nadu (Rufus 2009), Kozhikode, Kerala (Palot & Radhakrishnan 2004). These instances have also been reported in a review paper on colour aberrations in Indian herpetofauna by Mahabal & Thakur (2014). Accordingly, herewith we report this as a second record of albino Indian Flapshell Turtle from Maharashtra after 92 years of the very first record of albino turtle found from the state.

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The central American Tiger Lily, an invasive plant in and around Jalapahar-Cantonment Forest of Darjeeling Himalaya, India

Tigridia pavonia (L.f.) Redoute (Iridaceae: Tigridieae), commonly known as Tiger lily, is native to central American countries like Mexico, Guatemala, El Salvador, and Honduras. Bailey (1909) reported from southern United States. Although *T. pavonia* is distributed naturally as a wild species in much of Mexico than other central American countries, still it is naturalized in neighbouring South American Countries such as Ecuador, Peru, and Colombia as well as Madeira Islands of Portugal in Europe. So, Indian collection from Darjeeling Himalaya is an interesting one to be reported as an invasive taxon for the first time from southern Asian continent.

During field visit to Jalapahar-Cantonment Forest in late July 2015, authors collected few plant materials of a bulbous perennial herb with blood red-maroon flowers. Flowers were short-lived,

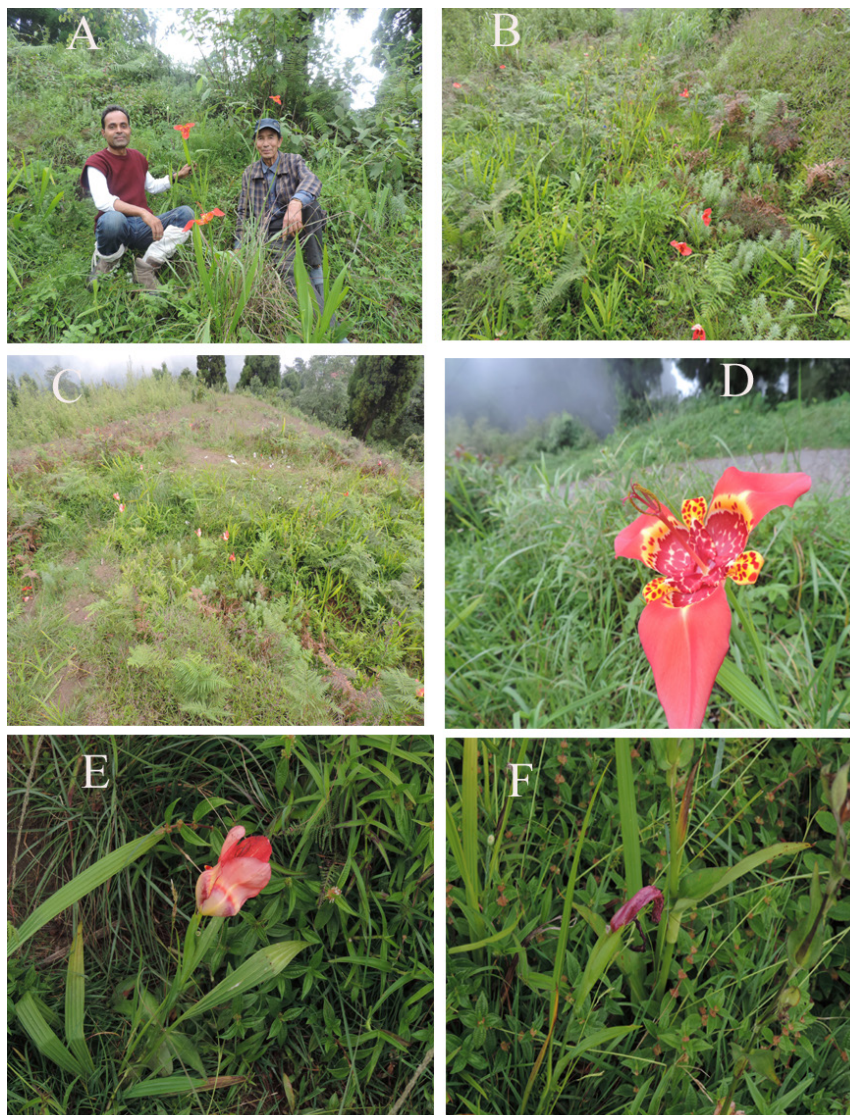


Image 1. A–F—Naturalized populations of *Tigridia pavonia* in Darjeeling: A—Senior Author & Jaikumar Thami with *T. pavonia* plants behind Jalapahar Cantonment Forest in July, 2015 | B—*T. pavonia* population 2 km down St. Paul's School, inside forest | C—valley near Alubari TN Road with *T. pavonia* | D—Full Bloom of *T. pavonia* at 12 noon | E—*T. pavonia* at 3 pm | F—*T. pavonia* at 4 pm. © Subhasis Panda & Leo Chhetri.

each bloomed for only one day for a shorter period (1000-1600 h), but often 2-4

flowers would bloom from the same stalk. After a critical study, this bulbous plant was

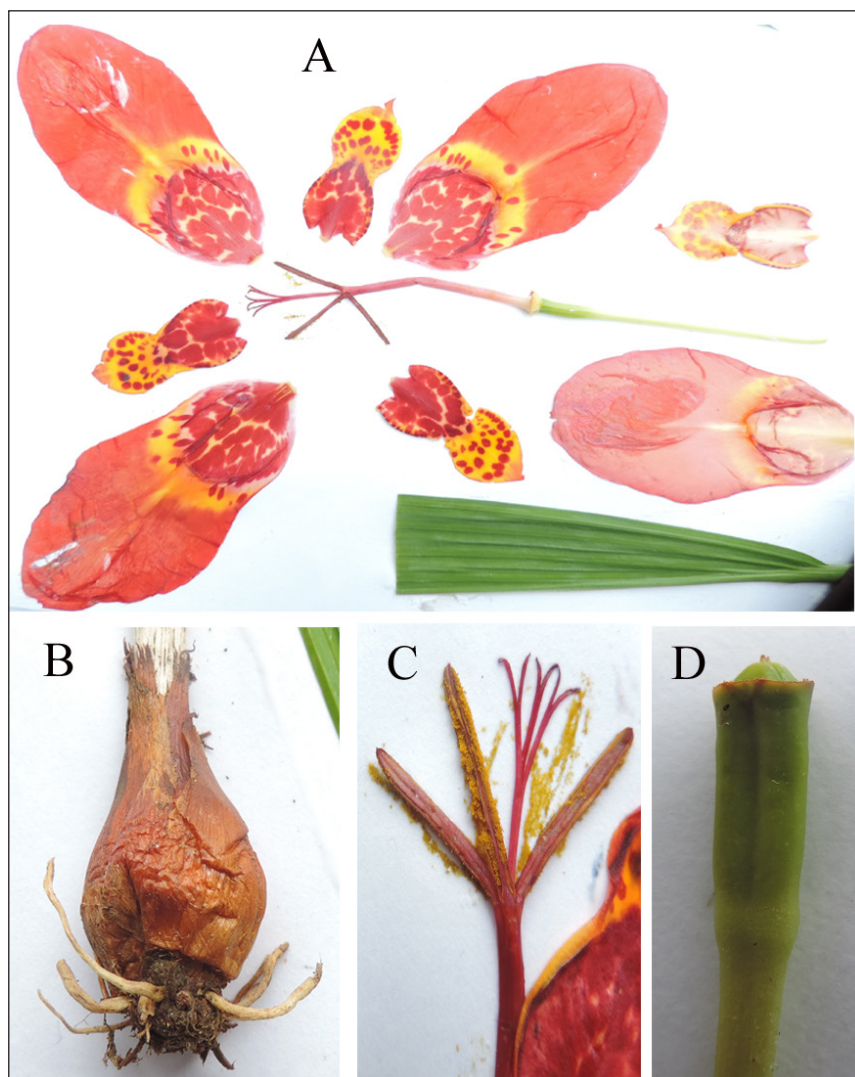


Image 2. A–D—Different parts of *Tigridia pavonia* in Darjeeling: A–Dissected flowering parts | B–Bulb | C–Stigmas with another lobes below | D–immature fruit. © Subhasis Panda & Leo Chhetri.

identified as *Tigridia pavonia* (L.f.) Redoute (Iridaceae: Tigridieae).

Populations of this species were widespread up to 4 km area in and around Jalapahar Cantonment Forest of Darjeeling Himalaya (2134–2286 m). According to the local Nepalese of Jalapahar, a Mexican teacher who came

to teach at St. Paul's School of Darjeeling at Jalapahar during 1890–1900 AD, took bulbs of *T. pavonia* from Mexico and planted in the garden of this school. This was the main reason behind the invasion of *T. pavonia* in and around Jalapahar Cantonment Forest. Field-based description of *T. pavonia* is provided here

along with live images. The present work is the result of an extensive field visit in and around Jalapahar Cantonment Forest (approximately 4km area) during last week of July to late August 2015. This work also recorded GPS (used GARMIN eTrex 10 model) data (latitude-longitude and altitudes) during field visits.

***Tigridia pavonia* (L.f.)**

Redoute, Liliac. 1: 5, t. 6, 1802. *Ferraria pavonia* L. f., Suppl. Pl.: 407-408. 1782; *Moraea pavonia* (L. f.) Thunb., *Moraea*: 14. 1787; *Vieusseuxia pavonia* (L.f.) DC., Ann. Mus. Natl. Hist. Nat.: 139. 1803. Type: Mexico, *Dr. Mutis s.n.* Vernacular Name: 'Piyaji Phool' (Nepalese of Jalapahar, Darjeeling: flower is originated from the bulb like onion plant).

Erect to suberect, bulbous perennial herb, 50-80 cm tall, glabrous; bulbs ovoid to narrowly ovoid. Flowering stem 28-38 (-48) cm tall with usually consisting of 2 to 3 branches, glabrous. Leaves: basal leaves 1-2, oblong-lanceolate to linear-lanceolate, 28-46 × 1.8-3 cm; cauline leaves 1-2, oblong-

lanceolate to linear-lanceolate, plicate, the lower 20-22 × 0.8-1 cm; the upper 6-8 × 0.4-0.6 cm.

Inflorescence in a rhipidium of 1-3-flowered with variable spathes (bracts). Flowers trimerous, 12-14 cm across, 11-16 cm long, slightly drooping, crateriform; tepals connivent at base forming a shallow cup with entire margin spreading distally (when in full bloom during 1200-1400 h), basally brilliant brown; outer tepals 3, ovate-elliptic, 7-10 × 3-4.5 cm, entire at margin, rounded with short apiculate at apex, basally white with densely maroon-spotted, middle orange-yellow and distally blood-red to pinkish red; inner tepals 3, ovate-deltoid with constricted at middle, unguiculate at base, 3.5-4.6 × 1-2.2 cm, orange-yellow spotted with dark maroon, entire at margin, acuminate at apex; nectary glands forming a yellowish-maroon band at the middle of the inner tepals, semicircular, 0.2-0.3 cm wide. Stamens 3; filaments connate, glabrous; anther lobes oblong, ascendent, granular, purple-red. Ovary narrowly to oblong-clavate, 0.9-1.1 cm long, light green;

style branches 5-6 mm long, deeply bifid into two style arms (0.3-0.4 cm long), reddish-brown to maroon; stigmas purple-red. Mature Capsule and seeds not seen, but young capsule oblong, green, 2cm long, glabrous.

Distribution: India, eastern Himalaya, Darjeeling, Jalapahar Cantonment Forest and Alubari TN Road forest between 27.029°N, 88.265°E and 27.048°N, 88.429°E (this work reports as naturalized); central America (Mexico,

Guatemala, El Salvador and Honduras as endemic); South America (Colombia, Ecuador and Peru as naturalized); Europe (Madeira Islands of Portugal as naturalized).

Phenology: Flowering in July-August. Fruiting: immature: late July-mid August; mature: late August to September (as reported by the local Nepalese).

Specimens examined: India, eastern Himalaya, Darjeeling District, 1 km down Jalapahar

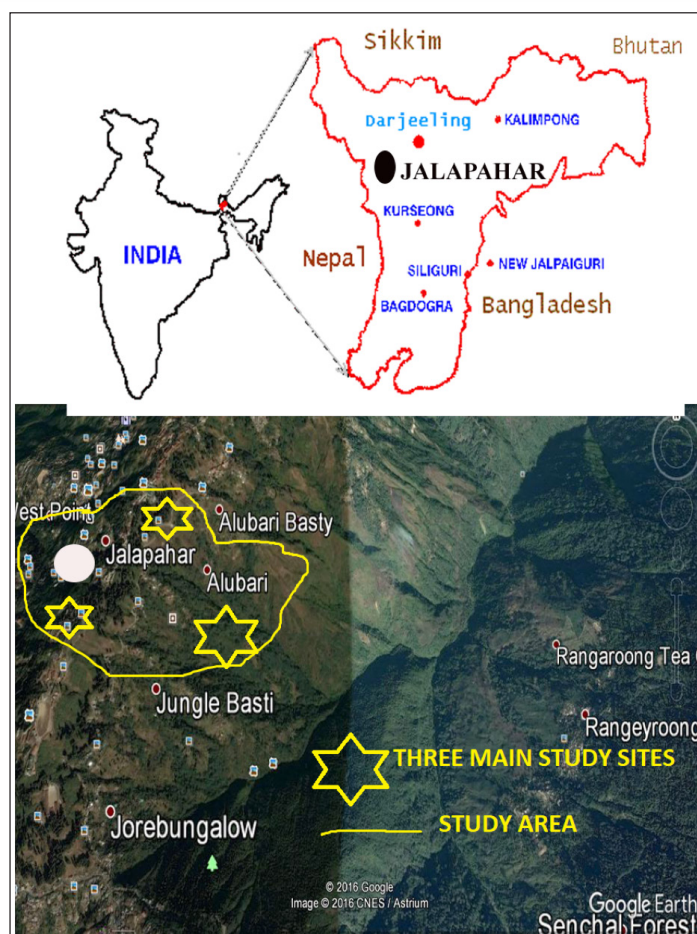


Figure 1. India and Darjeeling showing magnified satellite image of the study area.

Cantonment, inside forest, 26.vii.2015, 2195 m, Coll. S. Panda & Leo Chhetri; 182 (Darjeeling Govt College Herbarium: DGC); Darjeeling, Behind St. Paul's School, along valley, 30.vii.2015, 2286 m, S. Panda & J.K Thami; 192 (DGC), Darjeeling, behind Jalapahar Cantonment, toward Alubari TN Road down slope valley, 02.viii.2015, 2134 m, S. Panda & JK Thami; 177 (DGC).

Uses: Local Nepalese of Jalapahar use the bulb of this species as antipyretic as well as to relieve gastric problem.

Note on its abundance and density in the study area:

During field study in the study area (Figure 1) starting from Jalapahar Cantonment top to 4 km down till Alubari Valley through Jalapahar Cantonment Forest and T.N. Road as well as 2 km down toward Golden Pagoda and St. Paul's School sides, no quadrat samplings were undertaken, but based on detailed photographic images and field observations during visits, three main areas of abundance including densities of populations are described:- a. 1 km down behind Jalapahar Cantonment Forest with an approximate area of 25 m²—more than 75 individual plants were seen with 3–4 individual plants per m² area; b. 2 km down St. Paul's School inside Jalapahar Forest with an approximate area of 50 m²—more than 100 individual plants were seen with 2–3 individual plants per sq.m area; c. Valley near Alubari T.N. Road with an approximate area of 50 m²—more than 100 individual plants were seen with 2–3 individual plants per m². Besides these three sites, no trace of *T. pavonia* populations were seen in and around

4 km area of Jalapahar Cantonment Forest altitudes ranging from 2134–2286 m. No trace of *T. pavonia* populations were also seen in neighbouring areas such as Jungle Busty, Rangeroong Valley, Senchal Forest, Tiger Hill Valley, Golden Pagoda area, Ghoom, Toongsoong and other similar altitudinal areas in and around Darjeeling Town based on field visits to those areas from August 2012 to July 2016.

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Chemical immobilization of an injured Himalayan Ibex with Ketamine-Xylazine mixture

The Himalayan Ibex *Capra sibirica* is a true goat species of high conservation priority with a geographical distribution range in India, Pakistan, China, Afghanistan, Uzbekistan, Kazakhstan, Mongolia, Russia, Tajikistan, and Kyrgyzstan (Khan et al. 2016; Zahid et al. 2018). In India, it is found in the Karakoram Range, the Himalayan range and the Trans-Himalayan region of Ladakh and Himachal Pradesh (Raza et al. 2015; Zahid et al. 2018; Reading et al. 2020). They prefer high altitude mountainous regions habitat from 5,000 to 6,700m above mean sea level with rocky terrain and open alpine meadows and cliffs and during winter season they descend to lower elevations (Raza et al. 2015). Himalayan Ibex is protected and included in the Schedule I of India's Wildlife (Protection) Act, 1972. Poaching and competition with domestic livestock are some of the major threats faced by the Himalayan Ibex



Animal just after administration of reversal drug. © Department of Wildlife Protection, Leh.

in India (Usman et al. 2007). This note reports the successful chemical immobilization of an adult male Himalayan Ibex *Capra sibirica* whose age was estimated to be 12 years based on dentition and rings over the horns with an estimated weight of 100kg based on visual estimation for assessment and of an observed physical injury with lameness of left hind leg. The Himalayan Ibex was rescued physically by the villagers of Liktese, in the Rong area of Changthang range in Leh District of the Union Territory of Ladakh and handed over

to Department of Wildlife Protection, Leh, Ladakh.

Within 12 hours of entry to the Rescue and Rehabilitation Centre in Leh, the animal was chemically immobilized using a combination of Ketamine (100mg/ml; Vetalar, 10ml, Parke Davis & Co.) and Xylazine (100mg/ml; XylaMed, 50ml, Bimeda) at individual dosages of 1.5mg/kg body weight. The drug was remotely delivered employing a 3ml dart with plain needle (N1530 needle, 17G x 1.25" (1.5mm x 30mm)) over the right quadriceps muscle. Drug induction time was



Animal able to stand after administration of reversal drug. © Department of Wildlife Protection, Leh.

calculated from the time of darting to sternal recumbency. Physiological parameters such as respiration rate based on visual movement of the belly, body temperature based on rectal temperature and heart rate by chest auscultation were assessed based on per minute just after complete induction on approaching the animal.

Yohimbine (20mg/ml; Yohimbe, 20ml, Equimed USA) at dose rates of 0.125mg/kg body weight was used for drug reversal following completion of necessary procedures. The induction took place after four minutes of administering the Ketamine-Xylazine mixture with normal respiration rate (12/minute), heart rate (82/

minute), body temperature (39° Celsius) and eye open position along with minimal salivation and no response to stimuli showing excellent analgesia as the animal did not show any sign of reparatory depression, hyperthermia and profuse salivation. The animal was carried to an examination table for physical assessment of injuries by positioning it with neck straight, nose clear and on sternal position. On examination, it was found that the animal had severe injury in the gum region with profuse bleeding and with distal diaphyseal fractures of the femur. The actual weight of the Himalayan Ibex was found to be 110kg. Thus, the actual dose received by the animal was (Ketamine

@1.1mg/kg body weight and Xylazine@1.1mg/kg body weight).

The first sign of recovery was noticed within 20 minutes of administering the reversal, and the animal exhibited drug reversal in 80 minutes of administering the reversal injection. The whole capture time was of 120 minutes from the administration of Ketamine and Xylazine mixture till its complete revival.

Wild animals with conservation demand face various physical injuries demanding capture and handling for various veterinary interventions. Capture can be unfavourable causing extreme stress and fear in rescued wild animals leading to capture myopathy and eventual death (Usman et al. 2007). Capture myopathy is a metabolic muscle disease of wild animals (free ranging and captive) associated with capture-related stress and other stresses due to restraint and transportation (Williams & Thorne 1996). It has been reported that Himalayan Ibex capture myopathy is a fatal outcome of stress during capture and handling, which

thus requires extreme care during trapping, handling and transportation of a species of conservation priority (Zahid et al. 2018). In this context, chemical immobilization of a wild animal is a safe and effective strategy as it causes minimal stress (Neilson 1999).

There are no studies on chemical capture of Himalayan Ibex *Capra sibirica* from Ladakh. The drug combination of Ketamine and Xylazine mixture used during this incident to capture the Himalayan Ibex was found to be effective at a dose rate of 1.1mg/kg body weight for Ketamine and 1.1mg/kg body weight for Xylazine. The drug dose used in this instance to capture a Himalayan Ibex is lower to the combinations of Ketamine and Xylazine used for Alpine Ibex as reported by Caulkett & Walzer (2014).

The drug combination used in the study has been referenced for the first time for Himalayan Ibex *Capra sibirica*. The note is based on experience with a single individual and does not account for variations within sub-populations, forage, sex, subspecies or external factors such as weather and different drug combinations. A larger sample size would be advantageous to make the results most rigorous and insightful.

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Report of partially leucistic Lesser Whistling-Duck from West Bengal, India

Lesser Whistling-Duck *Dendrocygna javanica* is a medium-sized duck belonging to the family Anatidae. It is a widespread resident in the Indian subcontinent and is mostly found in freshwater marshes, shallow ponds, and lakes with emergent vegetations (Grimmett et al. 2011). It was listed as 'Least Concern' in the IUCN Red List assessment (Birdlife International 2016). It has a pale brown overall colouration with greyish-buff colour on the head and neck region, darker brown crown and nape, presence of chestnut-fringed feathers on the back, warmer chestnut colour underparts, chestnut upper tail coverts and dark grey bill and legs (Grimmett et al. 2011).

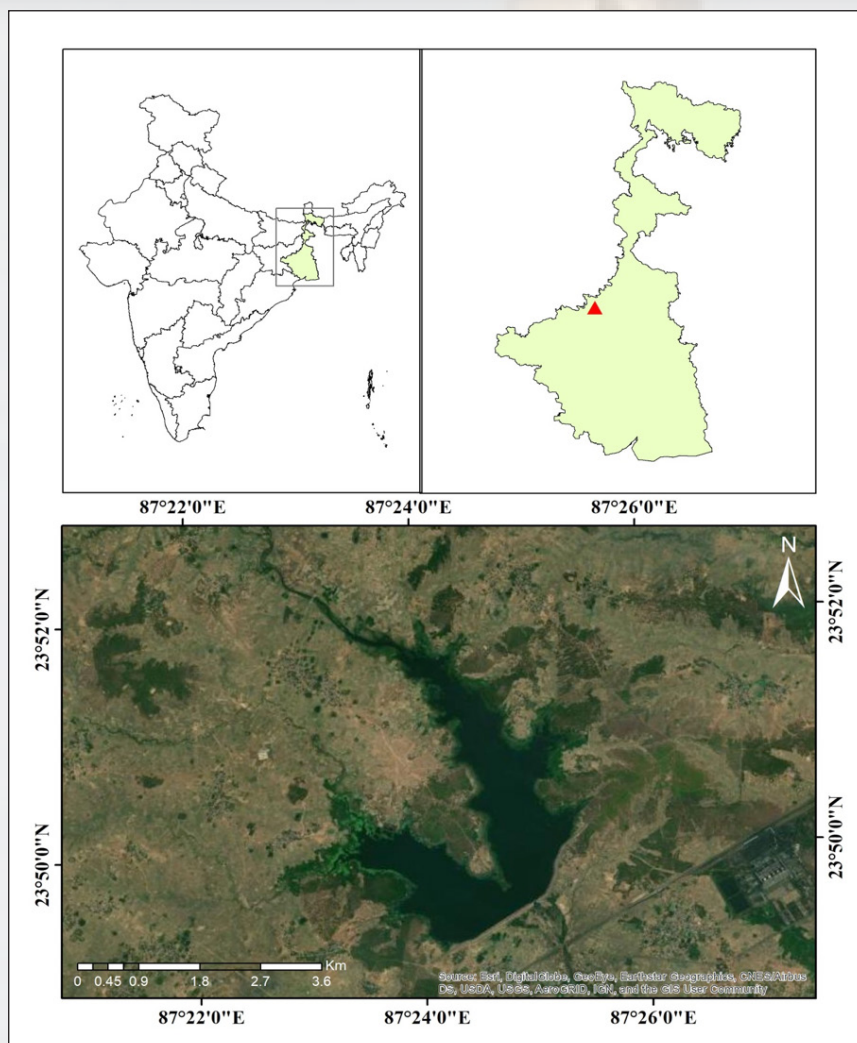
On 13 February 2021, while birding at Bakreswar Dam, Birbhum (23.83°N, 87.42°E), we observed an abnormal coloured duck in the dam amongst a big flock of about 100 individuals of Lesser Whistling-Ducks. We took photographs of the abnormally coloured



Partially leucistic Lesser Whistling-Duck amongst normal coloured Lesser Whistling-Ducks from Bakreswar Reservoir, Birbhum. © Subhadeep Saha on 13 February 2021.

individual. The duck was identified on the basis of its medium size, shape, beak structure, flight patterns, and call as Lesser Whistling-Duck. The individual was not normally coloured, it had the following characters: the crown was light brown instead of the dark brown colour; the buff greyish colour of the head and neck was replaced by mostly off whitish colour; the mantle and the tail had some normal chestnut coloured feathers; abdomen had a tinge of light chestnut shade instead of the warmer

chestnut underparts; rest of the body is mostly off whitish in colouration with a very little proportion of normal feathers in place of pale brown overall colouration, but eyes and beak were grey in colour like a normal individual. These characters clearly indicated that the bird we observed was partially leucistic. Incidentally, the third author also observed an individual with similar condition at forest lake 3, Ballavpur Wildlife Sanctuary, Birbhum (23.68°N, 87.66°E) on 25 January 2019. Leucism, a most common



Location from where the partially leucistic Lesser Whistling-Duck was observed.

variety of colour aberration in case of birds, can be defined as a condition which is related with the partial or total lack of the melanin pigments from the feathers. This phenomenon can vary from a few white feathers (partially leucistic) to totally white individuals (completely leucistic) (Grouw 2006). Leucistic birds are more noticeable than the normal coloured counterparts; there is a bigger risk of

predation. Moreover, it is also reported that these colour aberrant individuals, in occasional cases, may not be recognised or accepted by its potential mating partner (Mayntz 2020). Leucism is quite well documented in case of birds from India as well as from West Bengal, such as, Kalij Pheasant *Lophura leucomelanos* (Thareja & Thareja 2017), Collared Kingfisher *Todiramphus*

chloris (Adhikary & Mondal 2019), Jungle Myna *Acridotheres fuscus* (Nandy 2019), Brown Crake *Zapornia akool* (Byatroy 2019), Indian Peafowl *Pavo cristatus* (Yadav & Arigela 2020), House Sparrow *Passer domesticus* (Bera et al. 2021). The aberrations in colouration due to conditions like leucism and albinism is also well reported for the members of the family Anatidae from India like in Red-crested Pochard *Netta rufina* (Mahajan 2016), Garganey *Anas querquedula* (Karuthedathu et al. 2014), Knob-billed Duck *Sarkidiornis melanotos* (Newnham & Aitken 1886), Ruddy Shelduck *Tadorna ferruginea* (Karuthedathu et al. 2014), Gadwall *Anas strepera* (Harrison & Harrison 1972), Indian Spot-billed Duck *Anas poecilorhyncha* (Raju 2017) and in many others. A previous report on the albinism in case of Lesser Whistling-Duck is available from India (Chatterjee 1995) but there are no reports on the leucism of Lesser Whistling-Ducks till date from West Bengal. So, in this backdrop, this report forms the first ever observation record of leucistic Lesser Whistling Duck from

West Bengal. But as we have observed this bird only once during our study, it is hard to tell if this particular bird also had to face hard challenges in mating, camouflage, feather weakening or not. More detailed and prolonged study on the birds with abnormal colouration from West Bengal and India is needed which will surely unveil various new information about them.

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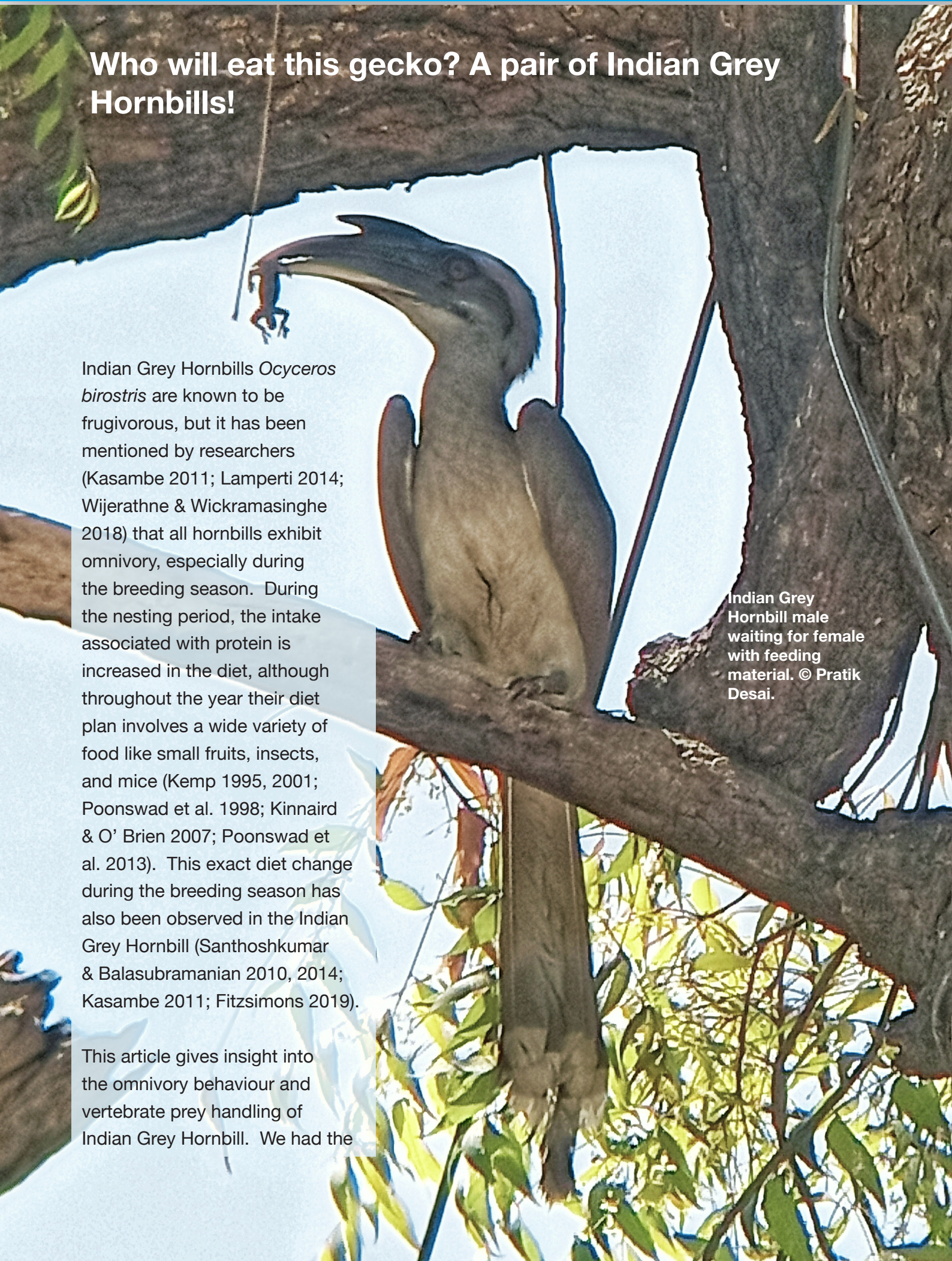
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Who will eat this gecko? A pair of Indian Grey Hornbills!

Indian Grey Hornbills *Ocyrocus birostris* are known to be frugivorous, but it has been mentioned by researchers (Kasambe 2011; Lamperti 2014; Wijerathne & Wickramasinghe 2018) that all hornbills exhibit omnivory, especially during the breeding season. During the nesting period, the intake associated with protein is increased in the diet, although throughout the year their diet plan involves a wide variety of food like small fruits, insects, and mice (Kemp 1995, 2001; Poonswad et al. 1998; Kinnaird & O' Brien 2007; Poonswad et al. 2013). This exact diet change during the breeding season has also been observed in the Indian Grey Hornbill (Santhoshkumar & Balasubramanian 2010, 2014; Kasambe 2011; Fitzsimons 2019).

This article gives insight into the omnivory behaviour and vertebrate prey handling of Indian Grey Hornbill. We had the

Indian Grey Hornbill male waiting for female with feeding material. © Pratik Desai.



opportunity to observe this interaction in the first week of April, which is considered the initial stage of their breeding season (Ali & Ripley 1983; Charde et al. 2011). The observation was conducted on 02 April 2021, at Hemchandracharya North Gujarat University Campus, Patan, Gujarat, India (23.8586°N, 72.1332°E).

A pair of Indian Grey Hornbills (an adult male and female) was sighted perching on an old Neem *Azadirachta indica* tree at the university campus at around 1100 h. The hornbills were observed for approximately an hour using a pair of binoculars (Olympus 10x50). The interaction between this pair was also documented by capturing pictures and videos. A house gecko *Hemidactylus* sp. was held by its neck in the bill of the hornbill. As the prey did not move, we presumed that the prey had died beforehand, and as we were using both the camera and binoculars for better inspection of the situation, we saw that the head portion of the prey was crushed. As the male was sighted first, we concluded that the male hunted the gecko; we also noticed that the male rubbed the gecko's head against the branch while waiting for the female. About 15 minutes later, we observed that the female came into the scene and perched on the same branch as the male.

A few minutes later, the male offered the gecko to the female; after receiving the gecko, the female also exhibited the same action of rubbing the gecko's head against the branch. Later, the female gave the gecko back to the male, and this exchange of passing the dead prey among themselves



A pair of Indian Grey Hornbills perching. © Purva Mhatre.

carried on for a while until the male flew to the opposite branch whilst the female feasted on the dead prey. We concluded that this behaviour of rubbing the lizard's head against the branch and offering the prey to each other might be a display of courtship. Kasambe (2011) also mentioned such courtship behaviour, where the male kept offering the female fruits, Garden Lizards *Calotes versicolor*, pieces of bark or mud pellets. The male was seen carrying fruit in its bill, ready to be delivered to the female. Even when the female did not accept anything offered, the male kept offering the food to the silent female. The pair also indulged in play behavior, such as passing food to each other without consuming, passing bark pieces, bill grappling, touching bills, and even pulling each other's tail.

Hemidactylus sp. is also known as a common gecko in India; some previous studies have also reported Garden Lizard as a food source of Indian Grey Hornbill during the breeding season. Animal preys are essential source of protein and both male and female hornbills were observed eating animals (Kasambe 2011). Fitzsimons (2019) and Lowther (1942) observed male Indian Grey Hornbills giving the Garden Lizard to the female in the breeding season, which was similar to this reported observation; however, Patel et al. (1997) did not agree with the formerly mentioned observations.

According to Santhoshkumar & Balasubramanian (2014), the Garden Lizard constitutes 0.06-0.10% of their diet in the breeding season. This observation helped understand the multifaceted dietary preference and feeding behaviour of Indian Grey Hornbill in the breeding season, where males deliver food (primarily vertebrates) to the female or young nestlings.

Indian Grey Hornbills have a versatile diet repertoire ranging from fruits to small animals; this wider feeding niche have helped the population of Indian Grey Hornbill to expand its distribution range from dry-deciduous forests to semi-arid regions of Gujarat State.

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First record of Bristled Grassbird from Paschim Bardhaman District, West Bengal

Bristled Grassbird *Chaetornis striata* is a globally threatened bird. It was considered 'Vulnerable' as per IUCN Red List published in 2017 (BirdLife International 2021). This species was also marked for conservation concern for 3 states (Uttar Pradesh, Uttarakhand, and West Bengal) according to the States of Indian Birds report (SolB 2020). The population of this species is rapidly declining due to rapid habitat loss, i.e., tall, dense grassland with wet soil. The species is resident and restricted at different lowland region of India (Madge 2020). As per the latest literature on the birds of West Bengal, the bird can be found at marshlands of northern part of the state and also at some districts of southern part (Kolkata, Hooghly, and South 24 Paraganas) (Baidya et al. 2017). Additionally, this species was also recently recorded multiple times from Paschim Medinipur District (Pal 2020).

An adult individual was first observed on 5 July 2020 at Andal (23.609°N, 87.237°E).

Adult Bristled Grassbird.
© Sankha Misra.



The habitat was tall grasslands which flooded seasonally with rainwater (Image 1). The location was very near to recently constructed Kazi Nazrul Islam Airport. Previously, the area (approx. 3,000-acre area including airport and the aero city project area) was seasonally flooded grassland and cultivation land, which was a perfect habitat for the Bristled Grassbird. The area was a paradise for different migratory & resident birds of more than a hundred species and also was home for a great variety of reptiles, amphibians, butterflies, & odonates (Nayak 2018, 2017, 2015). Nowadays, most portion of the habitat is already destroyed due to heavy construction activities surrounding the airport as a part of different development projects. The extent of the habitat loss can be understood to some extent from the Image 1.

The species was further recorded around the same location and those observations are summarised in Table 1 and Image 2. The nests were built at the lower half of the



Image 1. The nesting habitat of Bristled Grassbird as observed on 5 July 2020. © Sankha Misra.

grasses, near to the ground. Preferred habitat was tall grass of about 6–8 ft height. Surprisingly, all nesting sites were at close vicinity from human construction. Adults were found to be carrying food materials. First, they come and sit at mid height of the grass and then vanish inside the bush to their nest to feed their chicks. After that, the male bird was found to call for some duration from the grass-top, while the female bird was never found to call. Image taken during our field visit and sonogram of the call recorded given in Image 3, respectively. The

sonogram is usually mirrored 'N' shaped, may be broken

some time at the beginning. The species was never

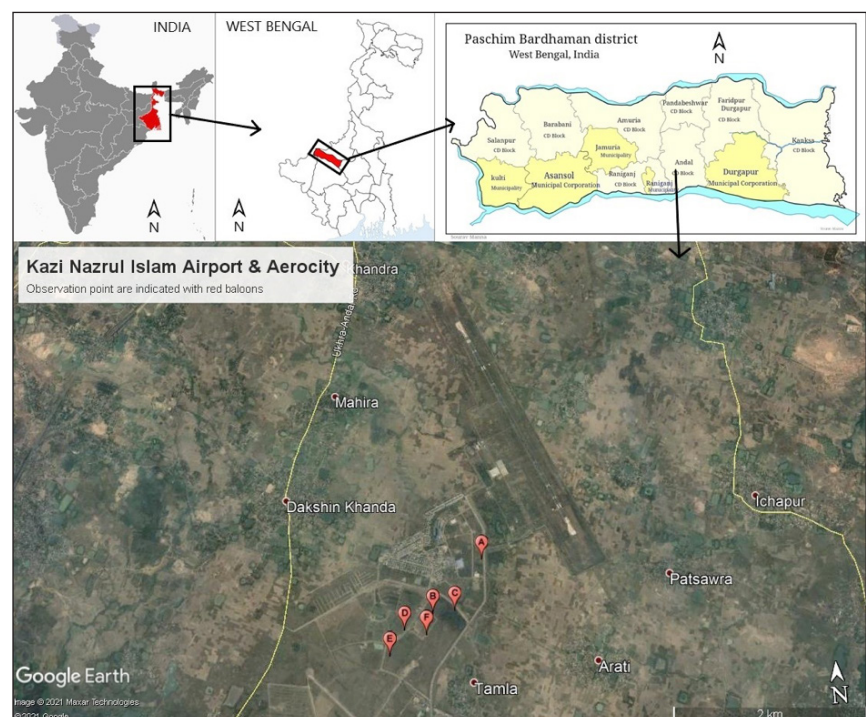


Image 2. Locations of all observations point (red balloon) in satellite image and relative location of the study area in map. The map of Paschim Bardhaman District developed by Sourav Manna.

Table 1: The table showing the location of the study sites, date and number of birds observed during all visits.

Site no.	Coordinates	Observation date	Number of birds
A	23.609194°N, 87.237778°E	5.vii.2020	1
B	23.604389°N, 87.232111°E	12.vii.2020	2
C	23.604500°N, 87.234417°E	26.vii.2020	6
D	23.600750°N, 87.227278°E	2.viii.2020	5
E	23.602444°N, 87.231250°E	29.viii.2020	1

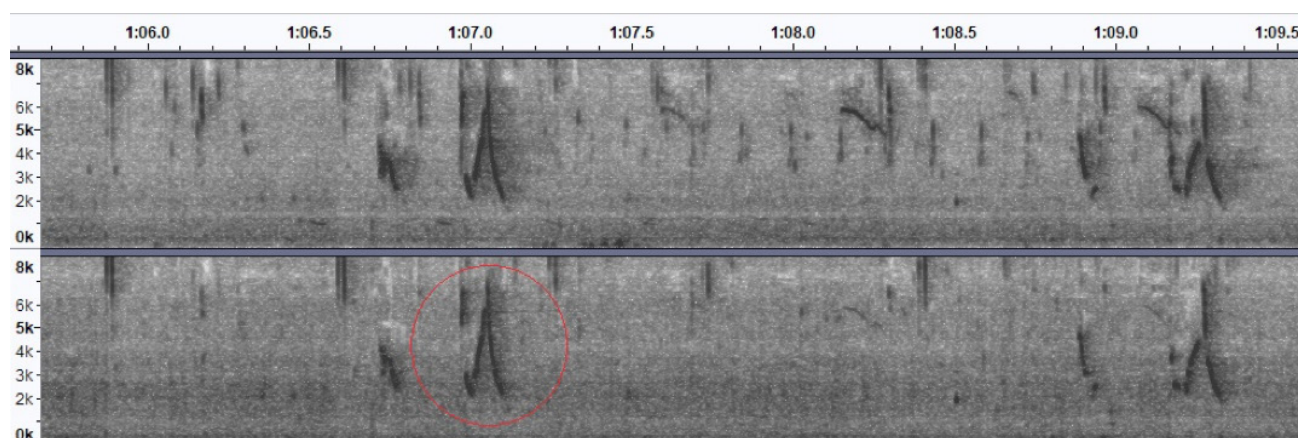


Image 3. Sonogram of the call recorded during the first visit by Sankha Misra .

recorded from Paschim Bardhaman District. Neither does it have any media documentation from adjoining Bankura, Birbhum and Purba Bardhaman Districts. The only previous record of this species near to the study site was from Bankura District around 50 years ago (Gauntlett 1985). This record indicates the presence of this species in this district and needs further search at similar habitats for their presence. The habitat of other sightings of southern Bengal is similar to the study sites. Interestingly, this species was also found to build their nest close to human settlement at Paschim Medinipur District (Pal 2020). Further, conservation of the habitat of this

threatened species is the prime need of the hour from the concerned authorities. Since the birds were found to build their nest at the remaining long grass patches, it is strongly recommended to conserve and fence the nesting sites. In addition, creating man-made fire at the long grasslands during dry-season should be strongly discouraged.

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