First Record of Leucism in Albino *Gazella bennettii* from the Western Thar Desert, Barmer, Rajasthan, India

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Abstract— *The leucism research study carried out in the Western part of Thar Desert in the Barmer district and this research is completely based on the observation and interview of the local people for Leucism in Albino Gazella bennettii (Indian Gazelle) locally called Chinkara. The Gazella bennettii (Indian Gazelle) is considered an endangered species by the International Union for Conservation of Nature (IUCN). In this Paper we describe the occurrence of leucism in Albino Indian Gazelle in Barmer first time. at Siyago ka tala, VP Kheda, Dhanau village of the Barmer district. General eco-behavior of this animal is noted which are similar to the normal Indian Gazelle.*

Keywords— Albino, Chinkara, Gazella bennettii, leucism.

I. INTRODUCTION

The Indian Gazelle, scientifically known as *Gazella bennettii* and commonly referred to as the Chinkara, belongs to the class Mammalia, order Cetartiodactyla, and family Bovidae. This species is easily identifiable by its reddish-brown fur on the underside and pale yellowish coat with faint white markings. The gazelle's fur undergoes seasonal changes, adapting to its environment. During winter, its coat turns a dark grayish-sandy hue, providing effective camouflage against predators, while in summer, it transitions to a deeper shade of brown. Both male and female Indian Gazelles possess horns, though there are notable differences. Males have longer, thicker horns with prominent rings and slightly curved tips, while females have shorter, slimmer horns with less pronounced rings. On average, the Indian Gazelle measures between 0.9 to 1.2 meters in length and stands 0.6 to 0.8 meters tall at the shoulder. Adult males typically weigh between 20 to 25 kilograms, whereas females are slightly smaller, weighing less and often standing up to 10 centimeters shorter than males (Jerdon, 1874; Groves, 1993).

A rare and noteworthy observation in the region was the recording of an albino gazelle in 2015, exhibiting abnormal body coloration (Khagendra et. All, 2016). Occurrences of fur color anomalies, such as albinism, leucism, and melanism, are quite rare in mammals and are not well-documented in scientific literature, especially concerning wild species. Most studies on mammalian coloration have concentrated on domesticated animals and laboratory mice, making sightings in the wild particularly important for understanding biological adaptations. In February 2024, a leucistic Indian Gazelle fawn was observed in the Western Thar Desert of Barmer District, Rajasthan, marking the first confirmed case of a leucistic gazelle in this area. This finding emphasizes the unique biodiversity of the Thar Desert and highlights the necessity for more research into the adaptive significance of these color variations in wild populations. Indian Gazelles have a polygynandrous mating system, where both males and females engage with multiple partners. Their diet primarily consists of desert vegetation, including grasses, cereals, legumes, fruits, and shrubs such as *Crotalaria burhia* (Bui), *Ziziphus nummularia* (Ber), *Prosopis cineraria* (Khejri), *Tecomella undulata* (Rohida), and *Lasiurus scindicus* (Sevan). These plants are well-suited to the dry environment and are vital food sources for gazelles. Indian Gazelles play an important role in the ecosystem by helping to maintain ecological balance and acting as indicators of environmental health. Unfortunately, their survival is increasingly at risk due to human activities. The growth of agricultural land, habitat fragmentation from fencing, and the use of chemical fertilizers and pesticides have greatly affected their populations. They also face dangers from natural predators like feral dogs and wolves, as well as conflicts with humans. Farmers often see gazelles as pests that damage their crops, which can lead to hunting or accidental harm. Research shows that the extensive use of agrochemicals not only impacts gazelles but also threatens

other wildlife, insects, and birds, disrupting the fragile balance of the ecosystem (Rajpurohit and Chena Ram, 2011). Conservation efforts are crucial to address these threats and help ensure the survival of this iconic desert species.

II. MATERIAL AND METHODS

Barmer, located in the western part of Rajasthan, India, is part of the vast Great Indian Desert, commonly referred to as the Thar Desert. This area is known for its dry landscape, featuring extensive sand dunes and a challenging climate. Within the Barmer District, you'll find the village of Siagon Ka Tala, which is part of the revenue village of Kheda, under the administrative oversight of Tehsil Dhanau, Panchayat Samiti, and Gram Panchayat Deengarh. Geographically, this region is situated at around 25.75°N latitude and 71.5°E longitude. The land is mainly covered with sand dunes, and the climate is extreme, with temperatures reaching between 45–52°C during the hottest months of May and June, while in winter, particularly in December and January, temperatures can plummet to as low as 0°C. Rainfall is limited and unpredictable, with about 90% of the annual precipitation occurring during the monsoon season, which generally takes place from July to September. The average annual rainfall is around 277 mm, making water scarcity a significant challenge for both the local population and the ecosystem.

The vegetation in Barmer mainly consists of xerophytic plants that are well-suited to the dry climate. Common species found in the area include *Acacia senegal, Prosopis cineraria* (known as the "khejri" tree, which is culturally and ecologically important in Rajasthan), *Capparis decidua, Prosopis juliflora, Calotropis procera, Crotolaria buhia, Salvadora persica, Salvadora oleoides, Ziziphus nummularia, Tecomella undulata*, and *Calligonum polygonoides*. These plants are essential for stabilizing the sandy soil, providing fodder for livestock, and supporting local biodiversity. The varying environmental conditions, characterized by extreme temperatures and scarce water resources, have created unique habitats that host a range of wildlife, including the Indian Gazelle (*Gazella bennettii*), commonly referred to as the "chinkara." This species is well-adapted to the desert and is frequently spotted in the Barmer region.

A study conducted in Siagon Ka Tala, a village within the Kheda revenue village, aimed to explore the ecological dynamics and biodiversity of the area. The village is managed by Gram Panchayat Deengarh, Panchayat Samiti, and Tehsil Dhanau, and is located at approximately 25.32°N latitude and 71.07°E longitude. During the fieldwork, researchers used visual observation techniques and photography to capture the flora and fauna of the region. They also gained valuable insights through discussions with local residents, who shared traditional knowledge about natural resources, wildlife, and the environmental challenges faced by the community. This collaborative approach not only enhanced the study but also emphasized the strong connection between the local people and their environment. The findings highlight the resilience of both the ecosystem and the inhabitants who have adapted to the harsh conditions of the Thar Desert.

III. OBSERVATION AND DISCUSSION

After September 2015, extensive field studies spanning over nine years were conducted in Western Rajasthan to document the presence of Albino *Gazella bennettii*. However, the sighting of a leucistic individual in the Thar region marks a significant first. In February 2024, villagers from Siagon Ka Tala discovered a small fawn of the Indian Gazelle with unusual coloration. This discovery prompted my visit to the area, located approximately 81 kilometers west of Barmer, as part of my fieldwork focused on studying fawns of the Indian Gazelle and exploring the region's faunal and floral diversity.

Upon observation, the primary distinction between the leucistic fawn and normal gazelles was its unique coloration. Unlike typical albino animals, which exhibit a complete lack of pigment, this fawn retained pigmentation in its eyes, a characteristic feature of leucism. This situation is quite unique, as leucism represents a partial form of albinism where pigment loss occurs in specific areas rather than entirely. To gain further understanding, I spoke with local residents, who provided valuable insights about their experiences with albino gazelles in the area. The fawn is currently being cared for at the Wildlife Conservation Centre in Devda, Dhorimanna, Barmer, Rajasthan.

This facility offers a secure environment for the animal while enabling researchers and conservationists to observe its health and behavior. The finding of this leucistic fawn not only showcases the genetic diversity within the *Gazella bennettii* population but also emphasizes the need for ongoing conservation efforts in the Thar region. Such rare events present unique chances to explore the genetic and ecological factors that affect pigmentation anomalies in wildlife, enhancing our overall understanding of biodiversity and species preservation.

3.1 Role of Bishnoi Community in Wildlife Conservation in the Thar Region:

The Bishnoi community is well-known for its strong dedication to wildlife conservation, particularly in the Thar Desert. Their cultural and religious beliefs prioritize the protection of animals, especially the Indian Gazelle (Chinkara), blackbucks, and other

native species. This commitment contributes to the higher biodiversity in these areas, as the Bishnoi community actively participates in conserving wildlife in the region. They treat these gazelles as if they were their own children, working diligently to protect them from poachers and habitat loss. Their deep-rooted traditions forbid the hunting of animals and the felling of green trees which is significantly contributing to maintaining ecological balance in the region. Bishnoi community efforts in wildlife conservation have led to flourishing populations of endangered species. By protecting natural habitats, opposing deforestation and preventing poaching they have played a critical role in sustaining biodiversity in the arid Thar landscape. Community participation to wildlife conservation always plays an effective role and the Bishnoi example serves as inspiration for sustainable coexistence between humans and nature.

FIGURE 1. While feeding the fawn with goat's milk

FIGURE 2: Fawn with boy and on field.

3.2 GPS location:

Siagon Ka Tala is a village located within the revenue village of Kheda, under the jurisdiction of Gram Panchayat Deengarh, Panchayat Samiti and Tehsil Dhanau, in Barmer District, Rajasthan, India. The approximate geographical coordinates are 25.32°N latitude and 71.07°E longitude.

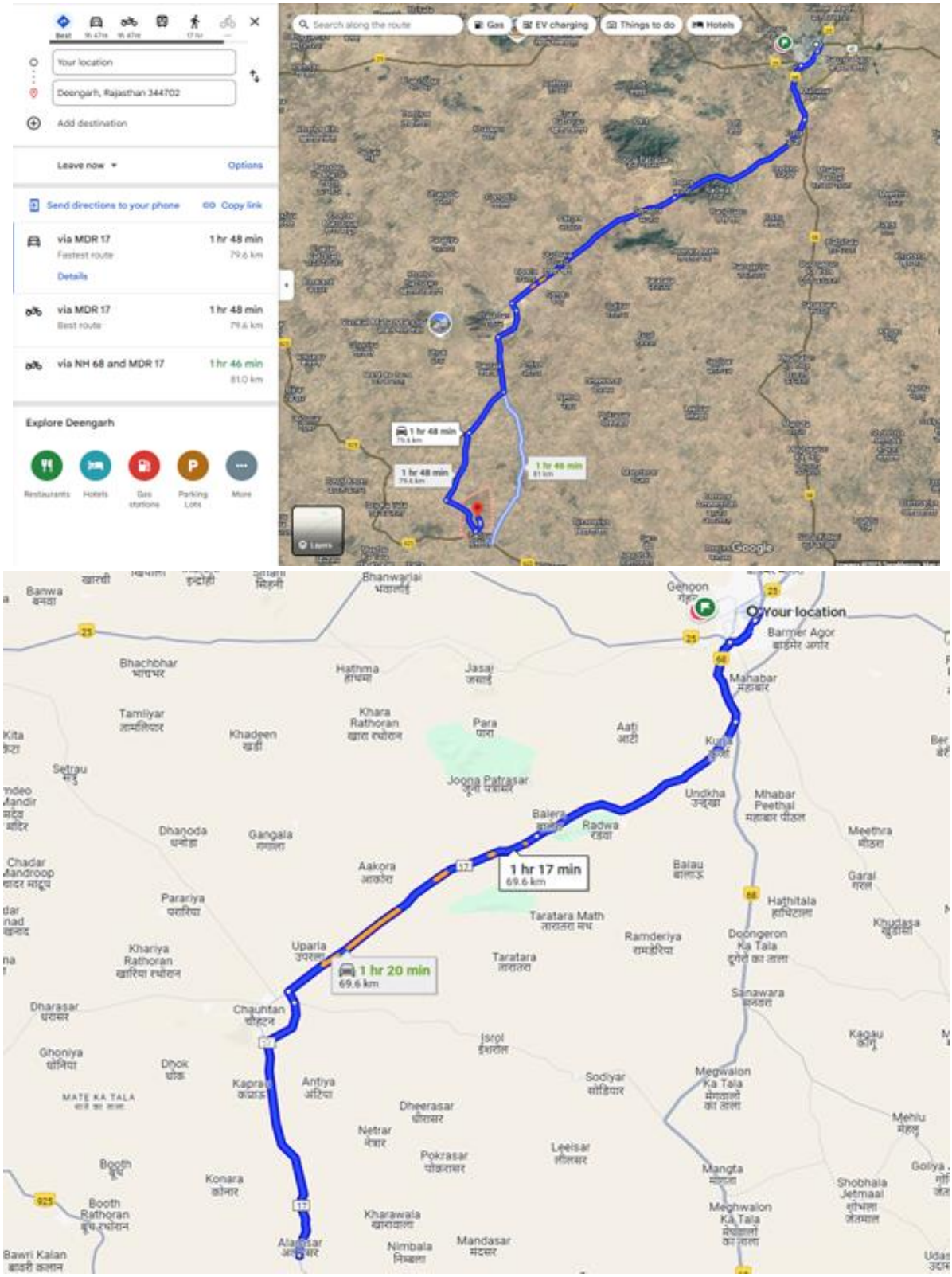

FIGURE 3: Location of Deengarh, Panchayat Samiti and Tehsil Dhanau, in Barmer District, Rajasthan, India

3.3 What is Leucism?

Melanin, a natural pigment, is responsible for the coloration of hair, skin, and eyes in humans and animals. It is produced by specialized cells called melanocytes. While the number of melanocytes remains consistent, variations in melanin production lead to differences in coloration, resulting in light or dark skin, hair, and eyes. The amount of melanin produced is influenced by genetic and environmental factors, which is why offspring often share similar skin tones with their parents. Melanin is categorized into five types: eumelanin, pheomelanin, neuromelanin, allomelanin, and pyomelanin. In humans, melanin primarily exists in three forms: eumelanin, pheomelanin, and neuromelanin.

Eumelanin, which includes brown and black subtypes, is responsible for darker shades in hair, skin, and eyes. The combination of black and brown eumelanin determines hair color, while red hair results from equal amounts of pheomelanin and eumelanin. Strawberry blonde hair, on the other hand, arises from a mix of brown eumelanin and pheomelanin. Pheomelanin gives pinkish hues to body parts such as the lips, nipples, and genitalia. Neuromelanin, found in neurons, influences the coloration of certain brain regions and plays a role in preventing cell death in specific areas. A deficiency in neuromelanin has been linked to Parkinson's disease, a neurological disorder. Beyond coloration, melanin also protects the skin by absorbing and dispersing harmful UV rays, preventing deep penetration and reducing the risk of damage such as oxidative stress, premature aging, diabetes, and even cancer.

Albinism is a genetic disorder characterized by abnormal coloration of the skin, hair, feathers, scales, or eyes(Hiler 1983). True or complete albinism involves the total absence of pigmentation in the skin and retina, while partial albinism occurs when pigmentation is reduced or absent in specific areas (Sandoval-Castillo et al. 2006). Leucism, a form of partial albinism, is marked by the retention of color in the eyes, (Berdeen and Otis 2011) bill, and legs, but a lack of pigment in the skin or plumage (Forrest and Naveen 2000). Albinism is caused by multiple genes (Summers 2009), whereas leucism is typically controlled by a single recessive allele (Owen and Shimmings 1992). Albino animals are rare due to the recessive nature of the alleles involved. Partial albinism is more common in small, isolated populations, where inbreeding increases the likelihood of such genetic traits being expressed (Holyoak 1978).

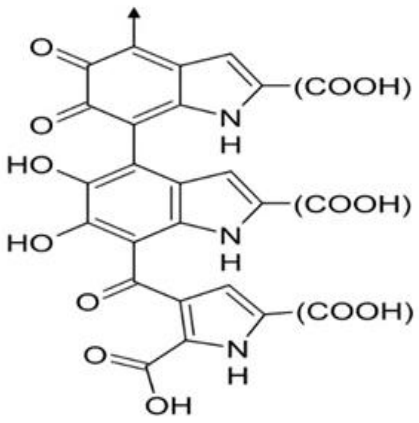

FIGURE 3: Eumelanin

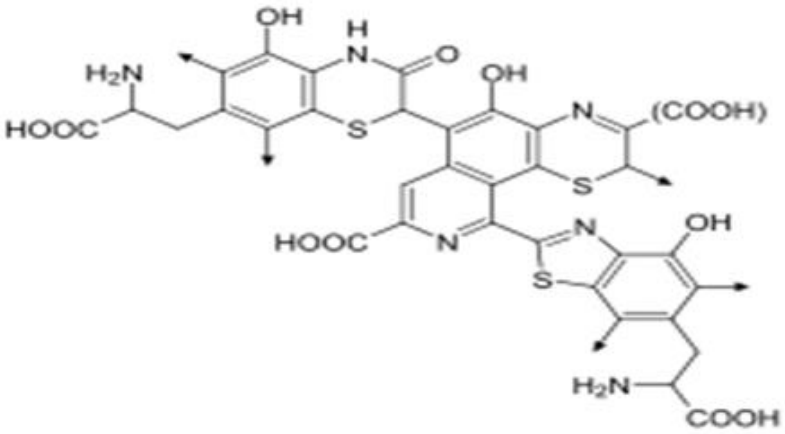

FIGURE 4: Pheomelanin

IV. CONCLUSION

Biodiversity faces significant threats due to various developmental pressures, including population growth, urbanization, industrialization, and the expansion of human civilization. Protecting biodiversity is crucial for sustaining life on Earth. The recent sighting of an Albino *Gazella bennettii* exhibiting leucism in the Thar Desert presents exciting new possibilities for wildlife conservation across varied landscapes. This finding underscores the urgent need for environmental awareness, greater public involvement, and a collective responsibility to safeguard and preserve biodiversity.

Ecologists view albinism as a significant disadvantage for wild animals for several reasons. The most apparent issue is the loss of camouflage, as white animals are more visible to predators compared to those that blend into their surroundings. Additionally, albino animals often suffer from poor eyesight due to a lack of pigment in their eyes, which hinders their ability to locate food or evade threats. Another challenge is intraspecific interactions; even if an albino animal survives to adulthood,

its ability to reproduce may be compromised. The lack of coloration can make these individuals more conspicuous to predators and potentially less attractive to mates, further threatening their survival.

AUTHOR'S CONTRIBUTIONS

This Research study has been carried out at Western Thar Desert of Barmer Rajasthan. The establishment of Methodology, literature collection, preparation of questionnaires, interviews of local people, photography of field and conductance of survey carried out by the Dr. Khagendra Kumar and Dr. CP Gharu.

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