



Short Communication

First Record of a Completely Albinotic (OCA Type 1) Wild Lesser Jerboa, *Jaculus jaculus* in the World from Saudi Arabia

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ABSTRACT

Albinism is a deficiency in melanin production due to genetic anomalies, which appear as the lack of coloration of part or in the whole body of an organism. These conditions are rare in wild animal populations. Here, we report the world's first record of a completely albinotic (OCA type 1) wild lesser jerboa *Jaculus jaculus*. During the survey on mammals in southwest Saudi Arabia on 15 May 2022, we captured one specimen of an adult albino male individual of lesser jerboa, in the region of southern Tathlith governorate in Asir province southwest of Saudi Arabia, in a sandy area with light vegetation cover surrounded by rocky hills and mountains.

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Authors' Contribution

ARA is responsible for collecting samples, taking morphological measurements, and photographing the samples. FAH takes morphological characters and writes the paper.

Key words

Albinism, Jerboa, Saudi Arabia, Tyrosine, Melanin gene

Melanin quality, quantity and distribution are mainly responsible for mammal skin, hair, and eye coloration (Ito and Wakamatsu, 2008; Fertl and Rosel, 2009). Melanin pigment is produced in melanocytes, mainly in the skin's epidermis, hair follicles, and eye (Hofreiter and Schöneberg, 2010). Mutations or alterations in the tyrosine gene may lead to a deficiency or decrease in melanin, and these conditions have been considered albinism (Acevedo and Aguayo, 2008; Fertl and Rosel, 2009).

Albinism is a hereditary condition in which the melanin pigment is absent or nonfunctional (Reum *et al.*, 2008). Individuals exhibit a total lack of coloration due to the absence of melanin-containing in the entire body (total absence of body, hair, and eye coloration) suffered from total albinism; on the other hand, partial albinism (leucism) is phenotypically characterized by the absence of melanin in some parts of the body or decrease of melanin in part or the whole body (Lutz, 2001), or piebaldism is another case in which the melanin pigmentation absent in some parts of the body, but the eye coloration remains normal (Fertl and Rosel, 2009; Abreu *et al.*, 2013).

Oculocutaneous albinism (OCA) is a hereditary disorder characterized by absent or decreased pigmentation in the skin, hair, and eyes. Most types of OCA are inherited in an autosomal recessive form, including OCA1 and OCA2. The OCA1 (tyrosinase-negative) is initiated by a mutation in the tyrosinase gene with either reduced tyrosinase activity (IB) or complete absence (IA). In comparison, the OCA2 (tyrosinase-positive) is also an autosomal recessive form initiated by a mutation in the OCA2 gene, which leads to reduced melanin production (Freund *et al.*, 2016).

Abnormal pelage coloration as an albinism condition has been mentioned in mammalian groups, including rodents, but despite the group's richness and this phenomenon is relatively poorly documented in the literature (Romero *et al.*, 2018). According to Romero *et al.* (2018), the reported albino specimens of the rodent species were less than 2%. In the family Dipodidae, only record documented albinism condition was in *Zapus princeps* which was recorded in the USA (Hart *et al.*, 2004).

The Arabian region is represented as a desert ecosystem because of the rare water resources in this hyper-arid region of the world. Saudi Arabia's desert fauna still needs to be scientifically explored more than any other system (Durant *et al.*, 2012). The ecological studies on terrestrial fauna and its distribution, especially mammals have not been explored well (Al-Sadoon *et al.*, 2016). Fortunately, many authors have increased our knowledge a few contributions about terrestrial mammals of this desert region like the most comprehensive study of

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mammals from the Arabian Peninsula and the neighboring countries. Harrison and Bates (1991) and their earlier work on mammals includes Harrison (1964, 1968, 1972, 1981) described comprehensive scientific texts the mammals of Arabia.

The lesser jerboa *Jaculus jaculus* is a member of the Dipodidae family, distributed all over North Africa and the Arabian Peninsula. It is considered one of the most successful mammalian groups of the Arabian Peninsula desert. Its habitat is desert, sandy and stony habitats (Buttiker and Harrison, 1982), which is characterized by its high jump movement like the kangaroo. This rodent can jump high to escape enemies because its hind limbs are much longer than the front limbs (Paray and Al-Sadoon, 2018). The hind limbs are remarkably elongated with three digits for each foot, and the central one is the longest. Hair tuft between fingers at the end of the limbs enables lesser jerboa to walk on the sand. Also, the distinctive structure of the ear enables it to hear low sounds (Osborn and Helmy, 1980; Paray and Al-Sadoon, 2018).

This lesser jerboa has a soft pelage, the usual coloration of the pelage is grayish sandy, with the faint gray basis of hair showing through in patches and with some very fine dark speckling above the posterior back with a lighter underside, ear tip pigmented (Osborn and Helmy, 1980; Paray and Al-Sadoon, 2018). It is a strictly nocturnal animal, spending the day hiding in its burrows. It's the nervous animal fighting to escape, not biting when handled and emitting sad cries. If captured from its tail, jerboas stop fighting and relax (Osborn and Helmy, 1980). Wild animals like reptiles, birds, and mammals hunt these jerboas. They are also hunted to be eaten in the central and northern areas of the Kingdom of Saudi Arabia (Paray and Al-Sadoon, 2018). The study aimed to find the first record of a completely albinotic (OCA type 1) wild Lesser Jerboa *Jaculus jaculus* from Saudi Arabia.

Materials and methods

An albino male specimen of lesser jerboa *Jaculus jaculus*, in addition to typically colored individuals, was captured alive on 15 May 2022 in the same habitats of the surveyed area southern of Tathlith governorate in Asir province southwest Saudi Arabia, site coordinates are 19°20'08.6"N, 43°40'04.5"E, at elevation 1.22 km a.s.l. (Fig. 1). The characteristics of the habitats has been detailed in the Table I.

The external morphological characters of the lesser jerboa specimens were measured to millimeters (mm). Fifth external morphological measurements were taken for each individual of the lesser jerboa *Jaculus jaculus* using a 0.1mm caliper, according to (Harrison and Bates, 1991). After some filed data sheet was completed, the lesser

jerboa *Jaculus jaculus* samples were released in their natural wild habitats.

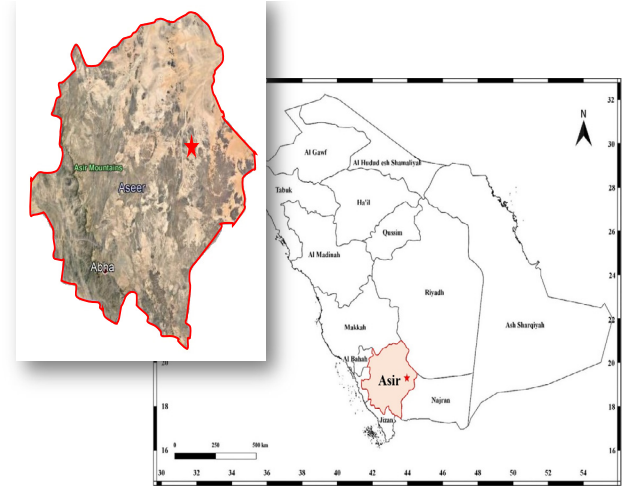


Fig. 1. A map showing the geographical locality from which the albino specimen of *Jaculus jaculus* was collected from Saudi Arabia.

Table I. Characteristics of habitat under study.

Information	Study area
Elevation	1216.79 m
Average annual temperature °C	27°C
Average annual humidity %	38.52%
Vegetation	Sparsely vegetated desert area with low cover shrubs

Results and discussion

Our knowledge of albinism animals is infrequent because this condition is rare to be met in wild animals, is non-contagious and is a genetically inherited condition that affects animals worldwide regardless of species or environmental conditions. Naturally, it results from a significant deficit in the production of melanin pigment and is characterized by the complete or partial absence of pigmentation in the skin, hair and eyes.

In this paper, we describe the first record of total albinism (OCA type 1) wild lesser jerboa *Jaculus jaculus* in the world from southwest Saudi Arabia and compare their morphological characters with those of typically colored. To date, there has not been any record of this abnormality (albinism) in the genus *Jaculus* and the family Dipodidae in the Arabian region. The only report of albinism condition in the family Dipodidae was recorded in *Zapus princeps* in the USA (Hart et al., 2004).

The albino male sample of lesser jerboa *Jaculus jaculus* was collected in the surveyed area southern of

Tathlith Governorate in Asir Province South West of Saudi Arabia, site coordinates is 19°20'08.6"N, 43°40'04.5"E, at elevation 1.22 km a.s.l., during the survey on mammals in a sandy area surrounded by rocky hills and mountains. This area exhibits a hot and humid climate with rare annual rainfall and limited water resources in a hyper-arid region. Also, it's covered with light vegetation of some shrubs and grass growing on the little amount of available annual water resources and it's fragmented in sandy zones between rocky hills and mountains of Asir province, southwest Saudi Arabia (Fig. 1).



Fig. 2. Extracted photographs showing the first record of the albino specimen of lesser jerboa *Jaculus jaculus* from Saudi Arabia.

One of the most important things we noticed about this albino sample of lesser jerboa is that it did not show the same reaction as its counterparts from the normal samples of typically colored jerboa, as it appeared in a quiet state and did not react violently to light or to holding it, and this was the first thing that drew our attention to this sample. Before checking its color, it becomes clear that its entire body is covered with thick white fur and suffers from severe visual deficiency. The present study describes the first record of the total albinism of the lesser jerboa *Jaculus jaculus* with a completely white body pelage coloration without any pigmentation at any part of its body with pink eyes suffering from poor vision. It is considered a completely albinotic case (OCA type 1) that was noted while handling the albino sample (Fig. 2).

The normal individuals of the lesser jerboa pelage coloration agree with what is known for the species. It usually exhibits grayish sandy, with the faint gray basis of hair showing through in patches and some very fine dark speckling above the posterior back with a lighter underside, ear tip pigmented and black eyes. Also, these rodents have long tufted tails with black sub-terminal bands and white tips (Osborn and Helmy, 1980; Paray and Al-Sadoon, 2018).

During the same period at the same site, we also recorded normal jerboa with typically colored individuals. After the external morphological characters were measured

to compare with the albino sample, all samples were released in their natural wild habitats. However, the albino lesser jerboa specimen is nearly identical in its external morphological characters because it lies within the normal range of the variation reported for those of typically colored individuals known for this species (Table II).

Table II. External characters of lesser jerboa *Jaculus jaculus* samples were collected from Saudi Arabia.

Char-acter	Albinism sample	Normal samples	After Harrison and Bates, 1991
TBL	260	261±8.5(255-267)2	276±15.2(234-317)97
TL	158	158.5±0.7(158-159)2	170±11.8(128-203)97
HF	60	59.5±0.7(59-60)2	57±2.5(51-64)88
FA	30	30±0.0(30-30)2	26.6±1.3(24-30)33
EL	18	18.5±0.7(18-19)2	21.9±1.8(17-26)96

TBL, total body length including tail length; TL, tail length, HF, hind foot length; FA, forearm length and EL, ear length taken from notch to tip.

This unique case represents the first record of a completely albinotic (OCA type 1) in wild rodents dwelling in the desert habitats of the Arabian Peninsula. The condition of total albinism and lack of coloration in the lesser jerboa has not been recorded before in the genus *Jaculus* in the world and the family Dipodidae in the Arabian region. The recordings occurred during the study on 15 May 2022. The adult albino male with a completely white body and pink eyes with poor vision observed and documented by several videos were taken during the night (Fig. 2). Due to the rigor situations in which this rare specimen had been caught, we had to photograph it, take some morphological measurements and released it into its natural wild habitats for fear of causing harm or death to it.

Albinism is a rare condition still undetected in most wild mammal species, at least in rodent individuals. However, the albinism events recorded might result from a hereditary condition in which the melanin pigment is either absent or nonfunctional (Reum *et al.*, 2008). The lack of coloration in albinos, in natural conditions, has tended to have reduced survival rates than any other individuals with normal coloration or make them less appealing for reproduction (Miller, 2005; Sandoval-Castillo *et al.*, 2006; Silva-Caballero *et al.*, 2014; Espinal *et al.*, 2016; García-Casimiro and Santos-Moreno, 2020); also, higher sensitivity to disease and poor vision may reduce the viability of albinos (Acevedo and Aguayo, 2008).

Conclusions

Albinism condition is rare to be met in wild animals. Here, we report the first record of a completely albinotic (OCA type 1) wild lesser Jerboa *Jaculus jaculus* in the world from southwest Saudi Arabia.

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Ethical statement

This work was carried out according to the ethical framework of wildlife protection laws in Saudi Arabia. Collecting samples of the wild lesser jerboa *Jaculus jaculus* for taking morphological measurements, photographing them, and re-releasing them to their nature isn't considered contrary to any of the laws of wildlife protection in the Kingdom of Saudi Arabia. It does not contradict the relevant international laws in this regard. Also, this species is widespread and not threatened, according to previous studies published internationally. In addition, the area is not protected and does not require permission to work within it.

Statement of conflict of interest

The authors have declared no conflict of interest.

References

- Abreu, M.S.L., Machado, R., Barbieri, F., Freitas, N.S. and Oliveira, L.R., 2013. *Braz. J. Biol.*, **73**: 185-194. <https://doi.org/10.1590/S1519-69842013000100020>
- Acevedo, J. and Aguayo, M., 2008. *Rev. Biol. Mar. Oceanograf.*, **43**: 413-417. <https://doi.org/10.4067/S0718-19572008000200017>
- Al-Sadoon, M.K., Paray, B.A. and Al-Otaibi, H.S., 2016. *Saudi J. Biol. Sci.*, **23**: 642-648. <https://doi.org/10.1016/j.sjbs.2016.04.005>
- Buttiker, W. and Harrison, D.L., 1982. *Fauna Saudi Arabia*, **4**: 488-502.
- Durant, S.M., Pettorelli, N., Bashir, S., Woodroffe, R., Wacher, T., De Ornellas, P., Ransom, C., Abáigar, T., Abdelgadir, M., El Alqamy, H. and Beddiaf, M., 2012. *Science*, **336**: 1379-1380. <https://doi.org/10.1126/science.336.6087.1379>
- Espinal, M., Mora, J.M., Ruedas, L.A., López, L.I. and Marineros, L., 2016. *Mastozool. Neotrop.*, **23**: 63-69.
- Fertl, D. and Rosel, P., 2009. Albinism. In: *Encyclopedia of marine mammals* (eds. W.F. Perrin, B. Würsig and J.G.M. Thewissen). Academic Press. San Diego, USA, pp. 24-26. <https://doi.org/10.1016/B978-0-12-373553-9.00006-7>
- Freund, K.B., Sarraf, D., Mieler, W.F. and Yannuzzi, L.A., 2016. *The Retinal Atlas E-Book*. Elsevier Health Sciences. pp. 13-231.
- García-Casimiro, E. and Santos-Moreno, A., 2020. *Neotrop. Biol. Conserv.*, **15**: 195-200. <https://doi.org/10.3897/neotropical.15.e50951>
- Harrison, D.L., 1964. *The mammals of Arabia 1. Introduction, Insectivora, Chiroptera, Primates*, Benn, London. pp. 192.
- Harrison, D.L., 1968. *The mammals of Arabia 2. Carnivora, Hyracoidea, Artiodactyla*, pp. 193-381.
- Harrison, D.L., 1972. *The mammals of Arabia 3. Lagomorpha and Rodentia*. Benn, London. pp. 382-670.
- Harrison, D.L., 1981. *Mammals of the Arabian Gulf. The Natural History of the Arabian Gulf*. Allen and Unwin London. pp. 92.
- Harrison, D.L. and Bates, P.J.J., 1991. *The mammals of Arabia*. Harrison Zool. Mus. Pub., pp. 354.
- Hart, E., Belk, M., Jordan, E. and Gonzalez, M., 2004. *Species*, **749**: 1-7. <https://doi.org/10.1644/749>
- Hofreiter, M. and Schöneberg, T., 2010. *Cell. Mol. Life Sci.*, **67**: 2591-2603. <https://doi.org/10.1007/s00018-010-0333-7>
- Ito, S. and Wakamatsu, K., 2008. *Photochem. Photobiol.*, **84**: 582-592. <https://doi.org/10.1111/j.1751-1097.2007.00238.x>
- Lutz, C.G., 2001. *Practical genetics for aquaculture*. Blackwell Science, Oxford. pp. 256. <https://doi.org/10.1002/9780470999837>
- Miller, J.D., 2005. *Missouri Conserv. Mag.*, **66**: 4-7.
- Osborn, D.J. and Helmy, I., 1980. *The contemporary land mammals of Egypt (including Sinai)*. Field Museum of Natural History Chicago ILL. <https://doi.org/10.5962/bhl.title.2801>
- Paray, B.A. and Al-Sadoon, M.K., 2018. *Saudi J. Biol. Sci.*, **25**: 604-608. <https://doi.org/10.1016/j.sjbs.2018.02.012>
- Reum, J.C.P., Paulsen, C.E., Pietsch, T.W. and Parker-Stetter, S.L., 2008. *Northw. Nat.*, **89**: 60-62. [https://doi.org/10.1898/1051-1733\(2008\)89\[60:FROAAC\]2.0.CO;2](https://doi.org/10.1898/1051-1733(2008)89[60:FROAAC]2.0.CO;2)
- Romero, V., Racines-Márquez, C.E. and Brito, J., 2018. *Mammalia*, **82**: 509-515. <https://doi.org/10.1515/mammalia-2017-0111>
- Sandoval-Castillo, J.E., Mariano-Melendez, C., Villavicencio-Garayzar, C., 2006. *Cybio*, **30**: 191-192.
- Silva-Caballero, A., Montiel-Reyes, F., Sánchez-Garibay, E. and Ortega, J., 2014. *Therya*, **5**: 839-843. <https://doi.org/10.12933/therya-14-193>