First record of albinism in the paca *Cuniculus paca* (Rodentia, Cuniculidae) in southeast Mexico

Erika García-Casimiro¹, Antonio Santos-Moreno¹

¹ Laboratorio de Ecología Animal, Centro Interdisciplinario de Investigación para el Desarrollo Integral Regional, Unidad Oaxaca, Instituto Politécnico Nacional. Calle Hornos número 1003, Colonia La Noche Buena, Santa Cruz Xoxocotlán, Oaxaca. Código postal 71230, México

Corresponding author: Antonio Santos-Moreno (asantosm90@hotmail.com)

Abstract

Even though there have been reports of anomalies in the colouration of several species of neotropical mammals, these events are considered to be rare within natural populations. Here we report the first case of albinism in the paca (*Cuniculus paca*). During the months of June and July 2017, we obtained several images of an adult albino male using camera traps in the region of Sierra Norte in Oaxaca, in the southeast of Mexico, in a medium subdeciduous forest.

Keywords

camera trapping, Hystricomorpha, melanin, neotropical mammals, pigmentation

Skin, hair and eye colour in mammals mainly depends on the quantity, quality and distribution of melanin (Ito and Wakamatsu 2008; Fertl and Rosel 2009). This pigment is produced in melanocytes, which are primarily found in the epidermis and eye and hair follicles (Hofreiter and Schöneberg 2010). Alterations or mutations in the tyrosinase gene can result in a deficiency or decrease of melanin (Acevedo...
and Aguayo 2008) and such conditions have been categorised as albinism (total absence of body, hair and eye colouration) (Acevedo and Aguayo 2008; Fertl and Rosel 2009), leucism (total or partial absence of pigmentation in the whole body except for the eyes and/or extremities which remain with dark or blue pigmentation) (Acevedo and Aguayo 2008; Fertl and Rosel 2009; Abreu et al. 2013) or piebaldism (loss of pigmentation in some parts of the body, but with normal eye colouration) (Fertl and Rosel 2009; Abreu et al. 2013).

Even though anomalies in colouration have been reported in many species of neotropical vertebrates, these events are considered to be rare (Abreu et al. 2013). Numerous cases of aberrations in colouration have been recorded in terrestrial mammals of small and medium size, such as primates (Espinal et al. 2016), ungulates (Veiga 1994; Puig et al. 2017), mustelids (Sobroza et al. 2016), procyonids (Silva-Caballero et al. 2014), marsupials (Abreu et al. 2013) and rodents (Oliveira 2009; Guevara et al. 2011; Brito and Valdivieso-Bermeo 2016).

In the case of rodents, of the 274 species that includes the suborder Hystricormorpha (Wilson et al. 2016), the presence of albinism has been documented only in five species of four families (Hystricidae, Erethizontidae, Caviidae and Octodontidae) (Romero et al. 2018), including a case of partial albinism in the agouti Dasyprocta azarae (Dasyproctidae) (Oliveira 2009). To date, there had not been any record of this abnormality in the paca (Cuniculus paca, Cuniculidae).

The paca is a caviomorph rodent with a neotropical distribution; it is solitary, territorial and nocturnal (Pérez 1992). It usually exhibits brown to dark brown colouration on both sides of its body from the neck to the ventral part, with three or four longitudinal stripes of light spots on the sides (Pérez 1992; Aranda 2000).

Even though Oliveira (2009) mentions albino pacas and agoutis, the reference cited by the author (Veiga 1994) only describes the case of an albino peccary. Therefore, the present work reports the first documented case of a paca with a completely white body during a demographic study of this species using camera trapping. The study was carried out from June 2016 to June 2018 in the region of Sierra Norte in Oaxaca, located in the southeast of Mexico, in the Municipality of Santiago Comaltepec, in the community of San Martin Soyolapam (17°33’50”N, 96°32’52”W, elevation 690 m; Fig. 1). The area exhibits a hot humid climate with rainfall in the summer and the mean annual temperature ranges from 10 °C to 26 °C (INEGI 2005). The dominant vegetation is medium subdeciduous forest with fragments used as agricultural zones, grasslands, open areas and human settlements.

The albino paca was an adult male, which was recorded during seven nights at the same camera-trapping site, where a Bushnell Trophy Cam™ camera with a passive infrared sensor was placed. The recordings occurred in the middle of the study (22 June, from 21 to 24 July and 27 and 28 July 2017). Although the cameras remained permanently active for another year after its sighting, this individual was not observed again. All records occurred between 21:55 and 05:02 hours, with temperatures ranging from 15 to 21 °C. Five of the seven records occurred during the new moon and the other two at the start of the first quarter moon. An adult male with
a completely white body can be observed in the photographs; however, the colour of its eyes could not be determined because the images were taken during the night and the eyes reflected the light from the camera trap (Fig. 2A–F). During the same period at the same site, we also recorded squirrels (*Sciurus* sp.), the white-nosed coati (*Nasua narica*), the collared peccary (*Pecari tajacu*), the tayra (*Eira barbara*), the Mexican agouti (*Dasyprocta mexicana*) and birds of large size, such as the great curassow (*Crax rubra*) and the West Mexican chachalaca (*Ortalis poliocephala*).

Animals that present conspicuous colouration, such as albinism, in natural conditions tend to have lower survival rates than individuals with normal colouration, since they are more susceptible to predators or less successful at capturing prey (Miller 2005; Silva-Caballero et al. 2014; Espinal et al. 2016). A reduction in pigmentation in prey species like the paca is considered to be a disadvantage because this condition increases the probability of detection by potential predators (Nedyalkov et al. 2014; Sobroza et al. 2016). Even though chromatic disorders are associated with pathologies, such as sensory or nerve defects, anaemia, low fertility, a higher susceptibility to disease and poor vision (Acevedo and Aguayo 2008), which result in lower survival rates, adult individuals with different colour aberrations have been recorded (Espinal et al. 2016), as in the case of the present study.

**Figure 1.** Location of record of albino paca (*Cuniculus paca*) at San Martin Soyolapam, Municipality of Santiago Comaltepec, in the Sierra Norte of Oaxaca, Mexico.
Figure 2. Photographs of a paca (*Cuniculus paca*) with normal colouration (A) and an albino individual in a medium subdeciduous forest in the Sierra Norte of Oaxaca, Mexico (B–F).

Acknowledgements

WeThanks to the Instituto Politécnico Nacional de México for financial support (grants SIP-20171154 and SIP-20180613 to the second author) and to the Consejo Nacional de Ciencia y Tecnología de México who awarded a scholarship to the first author.

References

Abreu MSL, Machado R, Barbieri F, Freitas NS, Oliveira LR (2013) Anomalous colour in Neotropical mammals: A review with new records for *Didelphis* sp. (Didelphidae, Didelphimorphia) and *Arctocephalus australis* (Otariidae, Carnivora). Brazilian Journal of Biology 73(1): 185–194. https://doi.org/10.1590/S1519-69842013000100020
Albinism in paca

Acevedo J, Aguayo M (2008) Leucistic South American sea lion in Chile, with a review of anomalously color in otariids. Revista de Biología Marina y Oceanografía 43(2): 413–417. https://doi.org/10.4067/S0718-19572008000200017

Aranda M (2000) Huellas y otros rastros de los mamíferos grandes y medianos de México. Instituto de Ecología, A. C. y Comisión Nacional para el conocimiento y Uso de la Biodiversidad. Distrito Federal, México, 212 pp.

Brito J, Valdivieso-Bermeo K (2016) First records of leucism in eight species of small mammals (Mammalia: Rodentia). Therya 7(3): 483–489. https://doi.org/10.12933/therya-16-408

Espinal M, Mora JM, Ruedas LA, López LI, Marineros L (2016) A case of albinism in the Central American spider monkey, Ateles geoffroyi, in Honduras. Mastozoología Neotropical 23: 63–69. http://www.redalyc.org/articulo.oa?id=45746645007

Fertl D, Rosel P (2009) Albinism. In: Perrin WF, Würsig B, Thewissen JGM (Eds) Encyclopedia of Marine Mammals. Academic Press. San Diego, USA, 24–26. https://doi.org/10.1016/B978-0-12-373553-9.00006-7

Guevara L, Ramírez-Chaves HE, Cervantes FA (2011) Leucismo en la musaraña de orejas cortas Cryptotis mexicana (Mammalia: Soricomorpha), endémica de México. Revista Mexicana de Biodiversidad 82(2): 731–733. https://doi.org/10.22201/ib.20078706e.2011.2.1194

Hofreiter M, Schöneberg T (2010) The genetic and evolutionary basis of colour variation in vertebrates. Cellular and Molecular Life Sciences 67(15): 2591–2603. https://doi.org/10.1007/s00018-010-0333-7

INEGI (2005) Prontuario de información geográfica municipal de los Estados Unidos Mexicanos, Santiago Comaltepec, Oaxaca. Clave Geoestadística 20458.

Ito S, Wakamatsu K (2008) Chemistry of mixed melanogenesis – Pivotal roles of dopaquinone. Photochemistry and Photobiology 84(3): 582–592. https://doi.org/10.1111/j.1751-1097.2007.00238.x

Miller JD (2005) All about albinism. Missouri Conservationist Magazine 66: 4–7.

Nedyalkov N, Koshev Y, Raykov I, Bardarov G (2014) Color variation of small mammals’s (Mammalia: Rodentia and Insectivora) coats from Bulgaria. North-Western Journal of Zoology 10: 314–317. http://biozoojournals.ro/nwjz/index.html

Oliveira SV (2009) Albinismo parcial em cutia Dasyprocta azaiae (Lichtenstein, 1823) (Rodentia, Dasypodidae), no sul do Brasil. Biotemas 22(4): 243–246. https://doi.org/10.5007/2175-7925.2009v22n4p243

Pérez EM (1992) Agouti paca. Mammalian Species 404: 1–7. https://doi.org/10.2307/3504102

Puig S, Videla F, Rosi MI, Seitz VP, Moreni J, Pérez M, Martín S (2017) Primeros registros de guanacos albinos en las montañas de la precordillera andina austral (Mendoza, Argentina). Multequina (Mendoza) 26: 77–86. http://www.redalyc.org/articulo.oa?id=42854899006

Romero V, Racines-Márquez CE, Brito J (2018) A short review and worldwide list of wild albino rodents with the first report of albinism in Coendou rufescens (Rodentia: Erethizontidae). Mammalia 82(5): 509–515. https://doi.org/10.1515/mammalia-2017-0111

Romero V, Racines-Márquez CE, Brito J (2018) A short review and worldwide list of wild albino rodents with the first report of albinism in Coendou rufescens (Rodentia: Erethizontidae). Mammalia 82(5): 509–515. https://doi.org/10.1515/mammalia-2017-0111
Silva-Caballero A, Montiel-Reyes F, Sánchez-Garibay E, Ortega J (2014) Leucismo en el coatí de nariz blanca *Nasua narica* (Mammalia: Carnivora), en Quintana Roo, México. Therya 5(3): 839–843. https://doi.org/10.12933/therya-14-193

Sobroza TV, Gonçalves AL, dos Santos LS (2016) Predation attempt and abnormal coat coloration of the tayra (*Eira barbara*) in the Brazilian Central Amazon. Studies on Neotropical Fauna and Environment 51(3): 231–234. https://doi.org/10.1080/01650521.2016.1227137

Veiga LA (1994) A case of albinism in *Tayassu tajacu* Linnaeus (Artiodactyla, Tayassuidae) in Serra do Mar, São José dos Pinhais, Paraná. Revista Brasileira de Zoologia 11(2): 341–343. https://doi.org/10.1590/S0101-81751994000200019

Wilson DE, Mittermeier R, Lacher TE (2016) Handbook of the mammals of the world, Volume 6. Lagomorphs and rodents I. Lynx Editions, Barcelona, Spain, 988 pp.