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A bank vole (*Myodes glareolus*) with complete leucism captured by a Eurasian kestrel (*Falco tinnunculus*) in Norway

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Small mammals with leucism are very rarely recorded, most likely because the probability of surviving to maturity would be very low for abnormal, white individuals. Here we report a record of a bank vole (*Myodes glareolus*) with complete leucism delivered to a nest of the Eurasian kestrel (*Falco tinnunculus*) in the boreal forest in SE Norway.

Complete leucism in birds and mammals is caused by a total lack of the colour pigment in skin, feathers and fur; only the pigments in the retina remain present and make the eyes look dark (van Grouw 2006). This phenomenon is sometimes referred to as "partial" albinism (e.g. Bowman and Curran 2000), but strictly it should be termed leucism (van Grouw 2006). Most records of leucism are from large mammals and birds (e.g. Hofmeyr *et al*. 2005, Alaja and Mikkola 1997, Nogueira and Alves 2011), and very few are from small mammals (Parsons and Bondrup-Nielsen 1995, Bowman and Curran 2000, Whitman 2009, Guevara *et al*. 2011). Because leucism seems to be a very rare condition in wild animals, reporting the time and location of such cases is valuable (Parsons and Bondrup-Nielsen 1995).

Here, we report a single case of complete leucism in the bank vole (*Myodes glareolus*) recorded during a study of the diet of the Eurasian kestrel (*Falco tinnunculus*) based on video monitoring of prey delivering to ten nests during the nestling period in June–July 2007. The ten nests had a mean nearest neighbour distance of 3.3 ± 0.3 (range 2.3–5.8) km, and were in nest boxes situated at an elevation of 637 ± 15 (range 558–694) m. The study area covered ca. 2000 km^2 of boreal forest in the Trysil municipality (Hedmark county, SE Norway, ca. 61°N, 12°E), was dominated by large bogs and intensively managed coniferous forest with a high proportion of clear-cuts, and had only negligible patches of farmland. The nest boxes were monitored simultaneously using a video surveillance system described by Steen (2009). The parent kestrels delivered 2163 voles to the nestlings during 151 complete monitoring days (Steen 2010). Of these, we studied 589 in detail, and identified 262 (44.5%) as bank voles.

On 30 June, at 17:58, the kestrel male was recorded to deliver a complete white bank vole to the female and the nestlings in a nest box located at an elevation of 558 m at 61°25´N, 12°33´E (Fig. 1). The video recording consists of a 9-second motion picture with 10 frames per second. The still images from the recording were

Fig. 1. Two screenshots from the video recording show the kestrel male delivering (**A**) a normal bank vole, and (**B**) a leucistic bank vole to the female and nestlings in the nest box.

analysed in detail with the Adobe Photoshop software (Adobe System Incorporated, California). The fur of the bank vole was completely white, while the eyes were dark. To our knowledge this is the first record of complete leucism in the bank vole. In other species of wild voles, only albinistic and partly albinistic (i.e. "partly" leucistic) individuals have been reported by Parsons and Bondrup-Nielsen (1995), Bowman and Curran (2000) and Whitman (2009). For small mammals like voles the probability of surviving with leucism to maturity would obviously be very low, due to the non-cryptic appearance and thus high exposure to predators hunting by sight, such as diurnal birds of prey (Kaufman and Wagner 1973). However, the leucistic bank vole seemed to have reached adult size. We adapted the grid system described by Steen (2010) to estimate the body mass of voles delivered to kestrel nests from their size on a monitor, and found that the leucistic bank vole had reached adult size; it was only 6% smaller than the largest adult bank vole and 72% larger than the smallest juvenile bank vole recorded during our experiment.

The abundance of small mammals in the territory of each of the kestrel pairs monitored was estimated by setting 120 snap traps (commercial brand "Rapp") for two consecutive days and nights in the area surrounding the nest, yielding a maximum of 240 trap nights per nest. The traps were permanently baited with cocoa fat (commercial brand "Delfia matfett"). A nest was chosen as a starting point and 30 traps were placed at intervals of ca. 10 m in each of the four cardinal directions. We trapped 342 bank voles and 124 other small mammals around the ten kestrel nests that we video monitored in 2007, and none of these had leucism. In 2008, 2009 and 2011, we studied another 26 kestrel nests in the same way, and recorded no specimen with leucism among the 169 bank voles and 568 other small mammals snap-trapped, or among the 122 bank voles and 808 other small mammals recorded delivered by the kestrels. Also there were no individuals with leucism among the 73 bank voles and 221 other small mammals recorded being delivered by kestrels to 25 nests in our study area in 2003, 2005 and 2006 (for details *see* Steen 2010). The other 60 video-monitored kestrel nests were within 23 km of the one where the leucistic bank vole was recorded. Moreover, among 1962 bank voles and 2502 other small mammals snap-trapped during 1977–2011 in another boreal forest area ca. 100 km WSW of where the leucistic bank vole was recorded [for description of methods, *see* Sonerud (1988)], no individual with leucism was recorded. Thus, leucism in bank voles and other small mammals in the boreal zone in SE Norway is exceedingly rare.

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