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The taxonomic status of *Lepus melainus* (Lagomorpha: Leporidae) based on nuclear DNA and morphological analyses

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Abstract

The taxonomic status of the species *Lepus melainus*, the Manchurian black hare, is intensely debated. It is considered either as a valid species or a black color morph of *L. mandshuricus*, the Manchurian hare. Herein, we evaluate the validity of *L. melainus* using 24 morphological traits and two nuclear DNA loci (TG=466bp; MGF=592bp) from newly collected specimens. Except for winter pelage, we fail to discover significant morphological differences between *L. melainus* and *L. mandshuricus*. Analysis of the nuclear DNA sequences reveals lack of reciprocal monophyly between *L. mandshuricus* and *L. melainus*, as they form one single clade with high bootstrap support; in addition, morphometric and morphological analyses found no specific differentiation between forms corresponding to *L. mandshuricus* or *L. melainus*. Together with the fact that the range of *L. melainus* is completely within that of *L. mandshuricus*, our study supports the recognition of *L. melainus* as a melanistic morph and junior synonym of *L. mandshuricus*.

Key words: *Lepus mandshuricus*, pelage, skull, TG gene, MGF gene, hares, taxonomy

Introduction

The Chinese hares (*Lepus*) are widely distributed throughout China from the Qinghai-Tibetan plateau to near sea level, and from mainland to the islands of Taiwan and Hainan. Northeastern China is characterized by the presence of several endemic species (Hoffmann & Smith 2005; Pan *et al*. 2007), but the validity of one of these species, the Manchurian black hare, *L. melainus* Li and Luo, is intensely debated (Flux & Angermann 1990; Hoffmann & Smith 2005; Wu *et al*. 2005).

The occurrence of a melanistic form of hare in northeastern China was first reported in 1870 from Ussuriland by Przewalsky (Loukashkin 1943), and later noted again by Sowerby (1923), who reported it as a black form of *L. mandshuricus* Radde. Two subspecies were described for these black hares: *L. brachyurus niger* from the Lower Amur River (Noack 1891), and *L. mandshuricus melanonotus* from Ussuri (Ognev 1922). Both taxa were relegated to the synonymy of *L. mandshuricus* by subsequent authors (Loukashkin 1943; Ellerman & Morrison-Scott 1951). Subsequently, Li & Luo (1979) described a new species, *L. melainus*, based on two blackish brown specimens in which the anterior upper premolar had a deep median re-entrant angle. The species was recognized by Flux & Angermann (1990). Hoffmann (1993) and Hoffman & Smith (2005), however, considered *L. melainus* as a synonym of *L. mandshuricus* because it occurred entirely within the range of *L. mandshuricus*, as well as *L. timidus* Linnaeus and *L. tolai* Pallas—the ecological sympatry of four species of hares was unprecedented. An extremely small mitochondrial (mt) DNA sequence divergence between *L. melainus* and *L. mandshuricus* was later reported (Wu *et al*. 2005), but the taxonomic conundrum remained unanswered.

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