



Geographic variation of the Anderson's Niviventer (*Niviventer andersoni*) (Thomas, 1911) (Rodentia: Muridae) of two new subspecies in China verified with cranial morphometric variables and pelage characteristics

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Abstract

A total of 66 specimens of *Niviventer andersoni* with intact skulls was investigated on pelage characteristics and cranial morphometric variables. The data were subjected to principal component analyses as well as to discriminant analyses, and measurement overlap was studied as compared with the coefficient of difference. The results indicate that three subspecies of *N. andersoni* can be recognized in China, including *N. a. andersoni* broadly distributed from northwestern Yunnan, Sichuan, northward to southern Shaanxi, and eastward to Hubei, *N. a. pianmaensis* subsp. nov. in western Yunnan, and *N. a. ailaoshanensis* subsp. nov. in Mt. Ailaoshan, central Yunnan province. Our study for the first time validates its subspecies differentiation that is most likely related to intra-specific geographic variation. In addition, a taxonomic revision of *Niviventer andersoni* in China is described.

Key words: Geographic variation, New subspecies, Numerical analysis, *Niviventer andersoni*, Morphometry

Introduction

Anderson's Niviventer, *Niviventer andersoni* (Thomas, 1911) (Rodentia: Muridae), which is distributed in Eastern Xizang (Tibet), Yunnan, Western Sichuan, Northern Guizhou, Southern Shaanxi, and Hubei, is endemic to China (Musser & Chiu, 1979; Corbet & Hill, 1992; Zhang *et al.*, 1997; Wang, 2003; Musser & Carleton, 2005). First of all, Allen (1940) and Ellerman (1941) listed it as *Rattus andersoni*, but Ellerman & Morrison-Scott (1951) regarded it as *R. coxingi andersoni*. In addition, Musser & Chiu (1979) made a systematic revision on this group treating it as *R. andersoni*, and furthermore Musser (1981) established the *Niviventer*-Group with diagnostic characteristics such as “the cranium is long, slender, and often flat; the rostrum is moderately long, narrow and nearly parallel-sided, and the anterior margins of the nasals are blunt; the interorbital region is narrow; the zygomatic arches are delicate and graceful; and the braincase is elongate and low”, and listed it as *N. andersoni* placed in the *N. andersoni*-Division. Finally, the relevant studies conducted by other researchers, including Corbet & Hill (1992), Zhang *et al.* (1997), Wang (2003), and Musser & Carleton (2005) all followed this conclusion.

Although there is no doubt about the validity of its specific status, further morphological study on intra specific geographic variation is yet to be performed. Therefore, in this study, both morphometrics on the skull of *N. andersoni* and comparison among their pelage characteristics were performed in order to study their geographic variation. We provide evidence that three subspecies of *N. andersoni* can be recognized in China, *N. a. andersoni* inhabiting from northwestern Yunnan, Sichuan, northward to southern Shaanxi, and eastward to Hubei provinces, *N. a. pianmaensis* subsp. nov. distributed in western Yunnan province, and *N. a. ailaoshanensis* subsp. nov. residing in Mt. Ailaoshan, central Yunnan province. In addition, the effect of environmental evolution on differentiation within *N. andersoni* is discussed.