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The mitochondrial phylogeography and intraspecific taxonomy of the Steppe Racerunner, *Eremias arguta* (Pallas) (Lacertidae: Sauria, Reptilia), reflects biogeographic patterns in Middle Asia

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Abstract

Steppe racerunner, *Eremias* (*Eremias*) *arguta*, is one of the most widespread species of the Asian racerunners (genus *Eremias*). Several subspecies were traditionally recognized however, morphological variability is so high that delimitation of these subspecies was always problematic. Here we present a phylogenetic hypothesis for this species based on cytochrome *b* sequences (55 samples from 35 populations, 900 bp partial sequences), infer its biogeography and revise its subspecific structure. Six major phylogenetic lineages were revealed. The southernmost populations (*E. a. uzbekistanica*) from Uzbekistan form a clade together with the Issyk-Kul Lake subspecies (*E. a. darevskii*) based on both molecular and morphological evidence. Within more northern populations, there is a split between populations from Northern Caucasus, Europe and Western Kazakhstan (*E. a. deserti*) and Central and Eastern Kazakhstan populations (*E. a. arguta*). Transcaucasian (*E. a. transcaucasica*) steppe racerunners are grouped with Middle Asian populations. Finally, the easternmost samples, assigned to “*E. a. potanini*” are nested within the *E. a. arguta* clade. Populations from the Ili River Valley form a separate lineage sister to the clade joining all other *E. arguta* lineages and might represent a yet undescribed taxon. Species distribution in relation to historical biogeography of Middle Asia is discussed.

Key words: Biogeography, *cyt b*, Kazakhstan, Turan, Central Asia, *Eremias*

Introduction

The arid realm of Middle and Central Asia is one of World’s largest and oldest desert regions (West 1983). Tracing its history to early Cenozoic Era (Fedorovich 1946; Kramarenko 1974), which expanded after the Indian collision, this arid area not only separated Oriental and Western regions but was also a place of origin for unique biotic complexes. Whereas the refugial hypothesis has been widely used in studies of phylogenetic history of European Biota (see Hewitt 2000), the arid areas of the Middle East and Middle Asia have not yet been sufficiently studied (Dolotovskaya *et al.* 2007; Graham *et al.* 2012; Guo *et al.* 2011; Melville *et al.* 2009; Nazarov & Poyarkov 2013; Orlova *et al.* 2007; Solovyeva *et al.* 2011; 2012; 2014).

Racerunners, or *Eremias*, are an Asian genus of the lizard family Lacertidae. The genus *Eremias* belongs to the lacertid subfamily Lacertinae, tribe Eremiadini of sub-Saharan origin (Arnold 1989; Arnold *et al.* 2007; Harris *et al.* 1998; Fu 1998, 2000; Mayer & Pavlicev 2007), and is the only lizard genus in this sub-family found exclusively in Asia. Taxonomy of this group is quite complicated and insufficiently studied (Sczcerbak 1974). Today the genus consists of ca. 35-40 recognized species found in Middle and Central Asia. The steppe racerunner, *Eremias arguta* (Pallas), belongs to the subgenus *Eremias*, which includes several species found exclusively in southern and central parts of Middle Asia (*E. aria* Anderson & Leviton, *E. intermedia* (Strauch), *E. nigrocellata* Nikolsky), whereas *E. arguta* has the largest range among other species and is found in the Black Sea region from Romania to Ciscaucasia, Eastern Transcaucasia and Middle Asia to the east as far as Chinese Dzhungaria and Dzhungar Gobi in Western Mongolia.

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