At least three species of ground squirrels are known from south-east Kazakhstan. These species are often considered as one wide-range polymorphic species, the red-cheeked ground squirrel *Spermophilus erythrogenys* sensu lato. The distribution area and taxonomic borders of this combined species remain questionable. We used molecular and bioacoustic tools for taxonomic separation of ground squirrels inhabiting the Dzungarian Alatau region of south-east Kazakhstan and adjacent territories. We examined 30 live-trapped individuals from three different populations (10 individuals per population) for acoustic structure of their alarm calls and for nucleotide polymorphism of the mtDNA C-region (1005-1006 bp) and cytb (1140 bp). We also examined DNA of eight museum specimens of *Spermophilus breviceuda*, *Spermophilus intermedius*, *Spermophilus carruthersi* and *Spermophilus iliensis* originating from the species complex distribution area. Additionally, six cytb sequences from Genbank were used (*Spermophilus iliensis* AF157856, AF157857; *Spermophilus relictus* AF157876; *Spermophilus pallidicauda* AF157866, AF157869; *Spermophilus erythrogenys* AF157875). The alarm call variables were similar between the three study populations and distinctive by their maximum fundamental frequencies (8.46±0.75 kHz) from those of *Spermophilus erythrogenys* from the Kurgan region of Russia (5.62±0.06 kHz). On the phylogenetic tree based on the cytb polymorphism, the ground squirrels from south-east Kazakhstan and adjacent territories divided on three clades with high (98–100%) bootstrap support: 1) *Spermophilus iliensis* (west of species area); 2) *Spermophilus intermedius* (center); 3) *Spermophilus breviceuda* (=*Spermophilus carruthersi*) (south-east). Study populations of *Spermophilus intermedius* probably deserve the species-level taxonomic rank. These data suggest that *Spermophilus erythrogenys* represents a paraphyletic taxon on both genetic (mtDNA) and phenotypic (alarm call) traits. A new taxonomic revision is needed. Supported by the RFBR grant 18-04-00400.
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