Mitochondrial DNA relationships among North Palaearctic Eptesicus (Vespertilionidae, Chiroptera) and past hybridization between Common Serotine and Northern Bat

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Abstract

Interspecific hybridization was proposed as one of the explanations for the lack of differentiation between mtDNA of the morphologically divergent bats Eptesicus serotinus and E. nilssonii. However, only West European populations of these species were examined so far. The cytochrome b mitochondrial gene sequences of E. serotinus originating from Russia were compared with those of other North Palaearctic Eptesicus. Common serotines from the Caucasus, Central and South Russia constitute a separate monophyletic group, distinct from western E. serotinus populations, E. nilssonii, and also from E. isabellinus. Only a common serotine from Kaliningrad region proved to be a member of the West European clade. According to these results one may suppose that most of Russian population of E. serotinus escaped the hybridization event that led to fixation of alien mitochondrial genome in the West European populations. Given that (i) preliminary nuclear data support the distinction between E. serotinus and E. nilssonii and (ii) E. serotinus appears morphologically homogeneous throughout the European part of its range, we consider that this past mtDNA introgression has no direct taxonomic implications. For the first time included in a molecular phylogenetic analysis, E. gobiensis was shown to be a full species, related to E. nilssonii. From our mtDNA phylogenetic tree, the taxonomic validity of the subgenus Amblyotus appears doubtful.

Key words: Eptesicus serotinus, mtDNA introgression, cytochrome b, molecular taxonomy

Introduction

In the last decades the application of molecular methods in bat taxonomy initiated significant changes in our understanding of phylogenetic relationships among extant species (Hoofer & van den Bussche, 2003; Mayer, et al., 2007; Ruedi & Mayer, 2001; Spitzenberger, et al., 2006). Among the most surprising findings of molecular studies on European chiropterans is the pattern of mitochondrial DNA (mtDNA) diversity found within the genus Eptesicus (Ibanez, et al., 2006). An unexpected result was the recovering of high similarity of mtDNA between the northern bat (E. nilssonii) and the common serotine (E. serotinus) in Western Europe (Mayer & Helversen, 2001)—a surprising outcome given that E. nilssonii was never previously treated as a close relative to common serotine. The two species are readily distinguishable on the basis of many diagnostic morphological traits (e.g. Bobrinskiy, et al., 1965), including body size (E. serotinus is significantly larger). Moreover, E. nilssonii is often placed in a separate subgenus or even genus Amblyotus (Tiunov, 1997; Horacek, et al., 2000), characterized, among other things, by its relatively primitive dentition. E. nilssonii and E. serotinus are noticeably different also, in their ecological affinities and patterns of distribution (Fig. 1). Whereas the northern bat inhabits mostly boreal and temperate woodlands of Northern Palaearctic; the common serotine is found in various habitats in temperate and subtropical regions from South-Western