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Molecular evolution and adaptation of the mitochondrial cytochrome *b* gene in the subgenus *Martes*

B. Li[1,2], B. Malyarchuk[3], X.B. He[1,4] and M. Derenko[3]

[1]Northeast Forestry University, College of Wildlife Resources, Harbin, China
[2]State Forestry Administration Detecting Center of Wildlife Resources, Harbin, China
[3]Genetics Laboratory, Institute of Biological Problems of the North, Far-East Branch of Russian Academy of Sciences, Magadan, Russia
[4]Harbin Zoo, Harbin, China

Corresponding author: B. Malyarchuk
E-mail: malyarchuk@ibpn.ru

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ABSTRACT. *Martes* species represent a typical example of rapid evolutionary radiation and a recent speciation event. To identify regions of the genome that experienced adaptive evolution, which might provide clues to their functional importance and may be informative about the features that make each species unique, we sought evidence of molecular adaptation in the mitochondrial DNA (mtDNA) cytochrome *b* gene in the subgenus *Martes*. Complete sequences of the cytochrome *b* gene were obtained from 87 samples, including 49 sables, 28 pine martens, and 10 stone martens, and were combined with mtDNA sequences of other true martens, such as *M. melampus* and *M. americana*. Analysis of the cytochrome *b* gene variation in true martens has shown that the evolution of this gene is under negative selection. In contrast, positive selection on the cytochrome *b* protein has been detected by means of the software TreeSAAP using a phylogenetic reconstruction of *Martes*

taxa. Signatures of adaptive variation in cytochrome *b* were restricted to the transmembrane domains, which likely function as proton pumps. We compared results of different methods for testing selection and molecular adaptation, and we supposed that the radical changes of the cytochrome *b* amino acid residues in the subgenus *Martes* may be the result of molecular adaptation to specific environmental conditions coupled with species dispersals.

Key words: Subgenus *Martes*; Adaptive evolution; Mitochondrial DNA; Cytochrome *b*

