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Apis cerana subspecies in North-East Asia

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The complete mitochondrial DNA (mtDNA) of A. cerana from Vladivostok, Primorsky Krai of the Russian Far East have been sequenced, annotated and uploaded to database Genbank (AP18450). MtDNA sequence has 15,919 bp length, AT-content 84% and GC-content 16% and contains 22 tRNA genes, 13 protein-coding genes, two ribosomal RNA genes, one AT-rich region and four non-coding intergenic regions (NC1-4). All protein-coding genes are started by ATT and ATG codons, excepting the start codon of ATP8 gene, which ATC, and are stopped by the common stop codons TAA and TAG. A comparative analysis of complete mtDNA of A. cerana from China, Indonesia, Korea, Malaysia, Russia, Taiwan, Thailand, Vietnam, and Japan found that the Russian Far East A. cerana differ from others on the subspecies level. Based on comparative analysis of complete mtDNA (~16,000 bp), nuclear DNA (nDNA) gene Vitellogenin (VG) (~4,100 bp) and morphological measurements (six parameters) we assumed that Russian Far-East A. cerana can be a distinct northern Asia population, which can be assigned as a separate unique subspecies of Apis cerana ussuriensis subsp. nov. Apis cerana koreana subsp. nov. is also validated and described as a new subspecies.

Key words: Apis cerana, Apis cerana ussuriensis, Apis cerana koreana, new subspecies, mitochondrial genome, mtDNA, nDNA, Vitellogenin, Russian Far East

Diagnostic characters to the genus Heterarmia (Lepidoptera, Geometridae, Ennominae) from Korea

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The genus Heterarmia Warren, 1895 characterized by male antennae structure. Only three species are recorded from Korea (Kim et al., 2016). This genus hard to distinguish because of similar external morphology. So in this study, we provide illustrations of Heterarmia species: H. dissilis (Staudinger, 1897), H. charon (Butler, 1878), H. buttneri (Hedemann, 1881) from Korea, with diagnostic characters.

Key words: Geometridae, Ennominae, Heterarmia, Diagnostic character, Korea