Molecular Characterization and Oxidative Stress Response of a Cytochrome P450 Gene (*CYP4G11*) from *Apis cerana cerana*

Weina Shi[a], Jing Sun[a], Baohua Xu[b,*], and Han Li[a,*]

[a] State Key Laboratory of Crop Biology, College of Life Sciences, Shandong Agricultural University, Taian, Shandong, 271018, P. R. China. Fax: +86–538–8242217. E-mail: lihan@sdau.edu.cn

[b] College of Animal Science and Technology, Shandong Agricultural University, Taian, Shandong, 271018, P. R. China. E-mail: bhxu@sdau.edu.cn

* Authors for correspondence and reprint requests

Z. Naturforsch. **68 c**, 509–521 (2013); received March 28/October 16, 2013

Cytochrome P450 proteins, widely distributed multifunctional enzymes, are mainly involved in biosynthetic and degradative pathways of endogenous compounds and the detoxification of xenobiotics in insects. Moreover, these enzymes exhibit peroxidase-like activity, therefore they may be involved in protecting organisms against the toxicity of reactive oxygen species (ROS). In the present study, we cloned a *CYP4G11* gene – *AccCYP4G11* – from the Chinese honey-bee (*Apis cerana cerana*). The open reading frame of the cDNA was 1656 bp long and encoded a 551 amino acids polypeptide, which shared high sequence identity with homologous cytochrome P450 proteins. In the genomic DNA sequence, a 5'-flanking region consisting of 1168 bp was obtained, and some putative transcription factor binding sites were predicted. Quantitative polymerase chain reaction (Q-PCR) revealed that the level of *AccCYP4G11* was higher in the epidermis than in other tissues, and *AccCYP4G11* was expressed in all stages with the highest level in two-week-old adult worker honey-bees. Moreover, the expression patterns under oxidative stress indicated that *AccCYP4G11* transcription was significantly influenced by external factors, such as temperature challenges, ultraviolet (UV) light, and insecticide treatment. *AccCYP4G11* was regulated differentially in response to oxidative stress and may be involved in protecting honey-bees from oxidative injury.

Key words: Apis cerana cerana, *CYP4G11*, Q-PCR, Oxidative Stress