

# Molecular Characterization of a Novel Acetylcholinesterase from the Diamondback Moth, *Plutella xylostella* (L.)

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Acetylcholinesterase (AChE) has been known to be involved in the resistance of organophosphorous and carbamate insecticides. To characterize AChE of the diamondback moth (DBM, *Plutella xylostella* (L.)), cDNAs isolated from adult heads encode two AChE genes. *ace2* type gene is identical to the report of Ni *et al.* (2003) whereas *ace1* type gene is novel. *ace1* type gene encodes 679 amino acids and has catalytic triads, 297S, 423E and 537H. The signal peptide of *ace1* has 19 amino acids from the start methionine, indicating that this protein is secreted out of cell membrane. Proteins purified by affinity chromatography were analyzed with liquid chromatography/ tandem mass spectrometry to determine the expression of AChEs *in vivo*. The expected sequences of purified proteins were identical to two AChEs, indicating that two AChEs are expressed *in vivo*. Northern blot analysis revealed that expression level of *ace1* type cDNA was much higher than that of *ace2* in all examined body parts. The highest expression level of *ace1* type gene in the head of a resistant strain indicated *ace1* type gene can be involved in the organophosphate resistance. Phylogenetic analysis showed that *ace1* type gene of the diamondback moth belongs to the cluster of Ace1, completely diverging from the cluster of Ace2.