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Molecular cloning and characterization of a new crystal protein gene from *Bacillus thuringiensis* KSK-1182

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A new *Bacillus thuringiensis* strain (KSK-1182), having high toxicity to *Spodoptera exigua* larvae, was found to have a *cry1F*-like new gene besides *cry1Aa*, *cry1Ab*, *cry1Ac*, *cry1E* and *cry2A* genes. Southern hybridization using a 2 kb fragment containing the *cry1F*-like PCR product was performed and a *Hin*dIII-*Xho*I 8 kb fragment was cloned. Through subcloning and construction of *ExoIII*-deleted mutants, a 5.3 kb fragment containing the full gene (named as the *cryX*) was sequenced. The *cryX* full gene was composed of 3,513 bp encoding 1,171 amino acid-long sequence. The δ-endotoxin of *cryX* contained all 8 blocks which played an important role in insecticidal mechanism. And its expression-regulating region of promoter, ribosome binding site, and terminator also existed but it had some different sequence from those of known *cry* genes. Through comparison of nucleotide and amino acid sequences between *cryX* and known *cry* genes, *cryX* showed only 77.6% and 73% homology to those of *cry1Ha1*, the most closely related, and it was concluded that it is a new δ-endotoxin gene.