Host Physiological Changes Due to Parasitization by a Braconid Wasp, *Cotesia plutellae*, on Diamondback Moth, *Plutellae xylostella*

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A braconid wasp, *Cotesia plutellae* (Kurdjumov), was collected from the parasitized host larvae of the diamondback moth, *Plutella xylostella* (L.) in Korea. The wasp made single parasitization on *P. xylostella*. Developmental period of the wasp was dependent on rearing temperature of the host. At 25ºC, average developmental periods of egg-larva, pupa, and adult stages of the wasp were 7.3, 5.7, and 18.0 days, respectively, in *P. xylostella*. Virus particles were found in the oviduct lumen of *C. plutellae* females. Viral replication in the oviduct began at adult development during pupal stage. Multiple nucleocapsids with 30 nm diameter and variable length (30-80 nm) were surrounded with a single unit membrane envelope. The parasitization completely inhibited larval-pupal metamorphosis. The parasitized larvae showed significant decrease in feeding activity and total hemolymph proteins especially at larval storage proteins. The parasitized larvae of both species also showed significant decrease in immune capacity that was analyzed by hemocyte nodule formation and induction of phenoloxidase or lysozyme activity. These results clearly indicate that *C. plutellae* has an endosymbiotic virus and causes host developmental arrest and immune-depression at parasitization.

Two factors have been suggested as potent agents to induce immunodepression and developmental arrest. Teratocytes, derived from extraembryonic cells of the braconid species, were found in the hemocoel of the parasitized *P. xylostella*. They were found initially at 3 days after parasitization and then kept their population at the level of 450 cells/l. The

increased level of teratocytes may reflect the inhibition on the activity of juvenile hormone esterase to explain the anti-metamorphic effect of the parasitization.

Genomic DNA of the *C. plutellae* polydnavirus (CpPDV) consisted of at least 8 segments with the size range of 3 to 20 Kb. C-type lectin gene was cloned from the CpPDV and showed high homologies with other lectins derived from other *Cotesia*-related PDVs. This viral lectin may be responsible for the depressed recognition capacity of the parasitized hemocytes.

Two major research directions should be followed to address the anti-metamorphic effect and immunodepression due to *Cotesia* parasitization. PTTH release and the following ecdysteroid biosynthesis can be the targets of the parasitization. Through this research, the factor responsible for the inhibitory effect can be determined whether it is derived from teratocytes or from PDV.

Full genome analysis is essential for determining the candidate factors responsible for immunodepression. So far, lectin gene is a potent inhibitor for immune recognition. Another candidate genes, found in other bracovirus genomes such as IkB and vinnexin, are expected to be cloned after genome work.