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学 位 （ 博 士 ） 論 文 要 旨

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論文題目	Distribution of Gustatory Receptors and Their Co-Expression with FMRFamide-Related Peptides in Enteroendocrine Cells and Neurosecretory Cells of Larvae of the Silkworm *Bombyx mori* **カイコガの中腸内分泌細胞と神経分泌細胞における味受容体の発現とそれら細胞における FMRF アミド関連ペプチドの共発現**				

論文要旨（和文要旨(2000 字程度)または英文要旨(500words)）

Insects taste nonvolatile chemicals through gustatory receptors (Grs) and make choices for feeding, mating, and oviposition. To date, genome projects have identified 69 Gr genes in the silkworm, *Bombyx mori*. However, the expression sites of these Grs remain to be explored.

In the Chapter 1, I explored expression cells of BmGr6. I used reverse transcription- polymerase chain reaction (RT-PCR) to investigate expression of the *B. mori* Gr-6 (BmGr6) gene, a member of the putative sugar clade gene family in various tissues. *BmGr6* was expressed in the midgut, central nervous system, and oral sensory organs. Immunohistochemistry using an anti-BmGr6 antiserum demonstrated that BmGr6 is expressed in cells of the antenna, labrum, maxillary galea, maxillary palps, and labium of the oral sensory organs. Furthermore, immunohistochemistry showed that BmGr6 is expressed in putative midgut enteroendocrine cells and in cells of the central nervous system including putative neurosecretory cells of the brain and ganglia. These results demonstrated that BmGr6 is widely expressed in both gustatory and non-gustatory organs.

In the Chapter 2, I clarified whether BmGr6-expressing cells are midgut enteroendocrine cells and CNS neurosecretory cells. Double-immunohistochemistry indicated that BmGr6 is expressed in midgut enteroendocrine cells, also in CNS neurosecretory cells. In particular, a portion of BmGr6-expressing cells, in both midgut and CNS, secreting FMRFamide-related peptides (FaRPs). These results suggest that BmGr6 functions not only as a taste receptor, but also as a chemical sensor such as for the regulation of gut movement, physiological conditions, and feeding behavior of larvae.

In the Chapter 3, I explored expression cells of BmGr9. In contrast to bmGr6, BmGr9 has been shown to respond specifically to fructose and function as a ligand-gated ion channel, but expression sites (cells) of this Gr are still unclear. I demonstrated using RT-PCR that *BmGr9* gene, was widely expressed in the CNS, as well as oral sensory organs. Additionally, using immunohistochemistry with an anti-BmGr9 antiserum, BmGr9 was shown to express in cells of the oral sensory organs including the maxillary galea, maxillary palps, labrum, labium, and also in CNS putative neurosecretory cells. Furthermore, by double-immunohistochemistry, most of BmGr9-expressing cells were co-localized with putative neuropeptide F1-expressing cells in the brain, suggesting that BmGr9 are involved in promotion of feeding behavior. In addition, a portion of BmGr9-expressing cells in the brain was indicated to be co-localized with cells expressing BmGr6, a molecule of the sugar receptor clade, suggesting that some other sugar may also regulate feeding behavior of *B. mori* larvae.

In the Chapter 4, the expression of putative bitter clade BmGrs genes in the midgut and CNS was also examined. By RT-PCR, I observed amplified products of 26 and 25 BmGrs genes in the midgut and CNS, respectively. In addition, *BmGr53* gene, was also found to be widely expressed in the organs and tissues of the *B. mori* larvae. Furthermore, by immunohistochemistry with an anti-BmGr53 antiserum, I showed that BmGr53 is expressed in cells of the brain, suggesting that BmGr53 may play roles in modulating feeding behavior or physiological homeostasis.