

The signum was found on the innersurface from 2 day-pupal stage as two bilateral folds. The signum formed heart-shape and sclerotized gradually. The suture between two sclerotized bilateral plate was elongated to time. The signum specific cell were lined on the back of signum.

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Morphological Changes in Development of Bursa Copulatrix on *Colias erate*(Lepidoptera)

Ok-Hui Im^{*} and Seon-Woo Cheong

Dept. of Biology, College of Natural Sciences,
Changwon National University, Changwon,
Kyungnam 641-773

The development of the bursa copulatrix of *Colias erate* was studied histologically. Materials were female pupae and they were supplied by breeding from eggs. The formation of the bursa copulatrix was not found at larval stage. At pupal stage, from 2 day-pupae to 5 day-pupae were dissected and bursae copulatrix were removed. At adult stage, both 5 or more fertilized and unfertilized females were dissected respectively. Removed bursae copulatrix were studied morphologically with binocular, stereoscope and SEM. The development of bursa copulatrix of *Colias erate* was confirmed from 2 day-pupal stage. At this stage, small corpus bursa with rudimental appendix bursa was found, and the appendix bursa was gradually grown up. The corpus bursa was compressed from 3 day-pupal stage, and swelled spherically by inclusion of spermatophore. Innersurface processes were distributed on opposite side of the signum. The signum was found on innersurface from 2 day-pupal corpus bursa and sclerotized from 5 day-paupal stage.

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Study on the Dopamine Transporter mRNA and Tyrosine Hydroxylase Protein in the Rat Midbrain by Nicotine and Smoking Exposure

Kun-Yang Kim^{*1}, Jong-Yoon Bahk² and Myeong-Ok Kim¹

Department of Biology¹ and Urology² Gyeongsang National University

Smoking is a highly addictive drug that binds to the dopamine transporter (DAT), initiates multiple actions within midbrain dopaminergic neuronal systems, and many of these alterations are permanent. DAT mRNA expression is accompanied by other presynaptic and postsynaptic dopamine neuronal changes. TH is rate-limiting enzyme of dopamine synthesis in the midbrain. TH and DAT are expressed in the substantia nigra pars compacta (SNpC), ventral tegmental ares (VTA). The object of these study was to determine the effects of nicotine and smoking exposure on the TH protein, DAT mRNA expression in the midbrain. Daily adult male sprague-dawley rats were administrated for 10 min, 30min and 1hr with cigarette smoking (3 times x 500 ml/day: 4 weeks, n=5) and nicotine (3 mg/day x 200 ml 4 weeks, n=5). TH protein and DAT mRNA were determined by immunocytochemistry and *in situ* hybridization. DAT mRNA and TH protein of nicotine group and smoking group were significantly decreased in SNpc and VTA. There for smoking, nicotine tended is higher suppresses on the DAT mRNA and TH protein expression than control in the rat midbrain. DAT binding sites show a distribution pattern similar to TH immunoreactivities. These results demonstrated that nicotine and smoking exposure suppresses expression for important regulatory proteins in the rats midbrain dopaminergic system.