

SL803

The pleiotrophic roles of *pleiohomeotic* locus during *Drosophila* development

전 상학 건국대학교 이과대학 생물학과

The *pleiohomeotic*(*pho*) gene is a member of the *Polycomb* group(Pc-G) genes, whose common role in development is to regulate the spatial expression of the ANT-C and BX-C genes. The goal of this research was to characterize the pleiotrophic effects of mutant alleles of *pleiohomeotic* on *Drosophila* development in a series of genetic and developmental analysis.

Homeotic genes determine the identity of segments. The boundaries of the homeotic gene expression domains are established by transiently expressed repressors encoded by the segmentation gene. The products of genes of the *Polycomb* group heritably maintain inactive transcriptional states, while the products of genes of the trithorax group(TRX-G) maintain active expression states of developmental regulators.

Mutation in the *pho* have maternal effects and cause homeotic transformations similar to those exhibited by gain of function mutations in homeotic genes. *pho* mutations cause abnormal head involution, partial homeotic transformation, and a variety of segmental defects in embryos. Adults homozygous for *pho* mutant alleles have several homeotic transformation phenotypes, including transformation of the antenna, leg, and abdominal segments. Molecular analyses showed that homeotic transformations were due to ectopic expression of homeotic genes in *pho* mutants. Unlike other Pc group genes, *pho* does not dramatically interact with the ANT-C and BX-C genetically and molecularly.

pho alleles enhanced mutations in other Pc group genes in embryos and adults, and this interaction is sensitive to changes of dosage of Pc group genes. All embryonic denticle belts in ventral side were transformed to that of the eight abdominal segments. All male tergi were transformed to fourth and fifth tergum. The sexcombs of the first legs of male flies were present in the second and third legs with a very similar pattern. Although the role of maternal products of Pc group genes has not been known, maternal products seemed to interact with the zygotic products of Pc group genes. As *Polycomb* and *polyhomeotic*, which are members of Pc group genes, coimmunoprecipitate and bind to identical sites on polytene chromosomes, Pc group gene products might form a multimeric complex and play a role in the long-term maintenance of the spatially restricted expression patterns of the homeotic genes.

pho maternal effect also alters several early development events. Embryonic segment defects occur predominantly in mesothoracic and odd numbered abdominal segments, but in some embryos adjacent groups of thoracic and abdominal segments are missing or defective. These patterns of defects have not been reported for mutations of other Pc group genes. Maternal effect *pho* mutations reduce or eliminate *en* expression in even numbered segments and in the ventral side of the embryo. This results suggest that *pho* maternal effect mutations may affect genes that act early in the segmentation process.

We conclude that *pho* has a broad role in development as well as in regulating the expression of the BX-C and ANT-C genes.