

Molecular machinery for the delivery of specific carotenoids to specific tissues in silkworm

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Animals use carotenoid pigments as colorants for their bodies, vitamin A precursors for visual chromophore synthesis, and antioxidants. Carotenoids are generally not synthesized in the animal body de novo, therefore must be obtained from the dietary sources and subsequently transported to target tissues. The transport pathway of specific dietary carotenoids from the midgut lumen to the silk gland in the silkworm, *Bombyx mori*, is a genetic model system for selective carotenoid transport because several genetic mutants with defects in parts of this pathway have been identified that manifest altered cocoon pigmentation. Using these mutants, we revealed that silkworm transports specific dietary carotenoids to target tissues by a combination of evolutionary conserved genes, such as steroidogenic acute regulatory protein (StAR)-related gene and CD36 family gene. These genes showed tissue-specific and developmentally regulated expression profiles in the midgut and the silk gland. Their homologs have been recently implicated in carotenoid accumulation in primate retina. Thus, carotenoid transport system would be conserved from mammals to insects and that the silkworm evolved it to color cocoons at least in part by regulating their expression patterns.