Retinoid-binding Proteins Involved in the Insect Photoreception

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Lipophilic molecules play important roles in animal behavior, physiology and metabolism. For example, lipophilic vitamins and hormones are indispensable for various physiological regulations. Because lipophilic substances are insoluble in aquatic environment such as body fluid and cytoplasm, water-soluble proteins that carry lipophilic molecules are essential for their transport and physiological actions. Various kinds of lipophilic substance-binding proteins have been found to function in vision as well as chemosensory and hormone reception. In vision, vitamin A-binding proteins are essential for the synthesis of visual pigments, and dysfunction of these proteins causes blindness in both vertebrates and invertebrates. Here, I introduce the recent advances in the study on retinoid- and carotenoid-binding proteins in insects, and summarize a possible metabolic pathway of retinoids for supplying the visual chromophore, 11-cis retinal. In particular, I will give a talk on our recent studies with a certain focus on two distinct retinoid-binding proteins, FBP and PDH in Drosophila. Both proteins are colocalized in the retinal pigment cells, and possibly cooperate with each other in the light-dependent formation of 11-cis retinoid required for the synthesis of visual pigments.