Comparative biochemistry and physiology of moth OBPs and CSPs

Jean-Francois “Jeff” Picimbon

High-Tech Research Center, Shandong Academy of Agricultural Sciences, P.R. China

Insects' odorant binding proteins (OBPs) are six cysteine residues linked by three disulphide bridges. The 3D OBP structures have been solved (three in moths). Moth OBPs fold into a globular “*kappu”*-like hydrophobic cavity (six α-helices), which is the binding site for odorant-like molecules.

In addition of OBPs, another family of binding proteins has been described in moths and nearly all other insect species, the ChemoSensory Proteins (CSPs). CSPs are not globular *kappu*-like proteins (a cup) but they are known to carry aliphatic lipid-like chemicals similarly to OBPs. However, in contrast to OBPs, CSPs are only four cysteines linked by two disulfide bridges. The CSPs fold into a “*purizumu*”-like structure (also six α-helices but a triangle prism) with a binding pocket very suitable to carry hydrophobic lipid-like molecules.

Both OBP and CSP structures are unstable and subjected to conformational changes that may underlie the protein function.

A cautious look at the tissue-distribution of OBPs, CSPs and resemble proteins not only in moths but also in all other insect species strongly suggests multiple functions for these proteins or a function related to the insect body shape. The entire insect body is covered with CSPs.