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Soluble olfactory proteins. A focus on social Hymenoptera

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Social Insects rely extensively on chemical communication in colonial defense, organization and reproduction. A large diversity of volatile and semivolatile compounds have been reported as semiochemicals, while cuticular lipids and especially hydrocarbons (CHs) are cues involved in nestmate recognition and fertility signaling. Two classes of small soluble proteins, Odorant Binding Proteins (OBPs) and Chemosensory Proteins (CSPs), mediate olfaction perireceptor events. Some OBPs and CSPs are only found in olfactory sensillar lymph, where they are believed to transport odorants/pheromones to receptors, while others are present in pheromonal glands or perform unrelated functions in different body tissues and fluids. Based on the importance of chemical communication and the variety of semiochemicals, Social Insects are expected to present high numbers of OBPs and CSPs with complex patterns of expression. Moreover, first reports of CSPs in ant antennae suggested that CSPs could mediate CHs perception. However, so far, analysis of OBP and CSP genes in the genomes or EST libraries of social species have not shown higher complexity with respect to solitary species, while hydrocarbons were never found as endogenous ligands of CSPs. Using different proteomic approaches, we have analyzed the expression of OBPs and CSPs in pheromonal glands, olfactory organs and other tissues/organs of *Apis mellifera*. We found that the highest number of OBPs (13 out of 21) is expressed in the distal antennal segments and that two are highly expressed in larvae (OBP14) or in juvenile females (OBP13). OBP21 is highly expressed in the mandibular glands. Only two of the six CSPs were detected at the protein level. CSP3 in most tissues, CSP1, instead, more specifically in antennae. A comparison of the expression pattern of OBPs and CSPs in the honeybee will be compared with information available so far in other Social and non social insects.