Summary

In my thesis I have investigated the roles of embryonic developmental patterning genes in much later postembryonic roles, in the development of complex sensory systems. I have shown the expression and function of *ems* in the development of the olfactory sense organs and the olfactory sensory neurons. Interestingly I find that a brief pulse of *ems* expression in the precursors of olfactory sense organs has a significant impact on the cells that derive from these precursors; in the absence of *ems*, the specification of the sense organs is affected and the olfactory sensory neurons are unable to target appropriately to the antennal lobe in the brain. In another part of my thesis, I have uncovered an unexpected role for *otd* in the formation of the central interneurons of the olfactory circuitry. In this work I show that *otd* is expressed in a non-antennal lobe neuroblast lineage in the central brain. In the absence of *otd*, I find that these neurons appear to have transformed into antennal lobe projection neuron lineage. This unexpected finding has implications for our understanding of the manner in which neurons in the brain are specified.