Dorsal closure is a morphogenetic event occurring in Drosophila melanogaster that seals an epithelial gap during mid embryogenesis. A process called zipping concludes dorsal closure. Cellular protrusions from opposing epithelial leading edge cells sample the open space until the gap has closed sufficiently for them to engage with their accurate counterparts. Zipping progresses simultaneously from the anterior and the posterior opening towards the middle and results in the sealing of epidermal sheets and formation of mature adherens junctions.

The fly embryo epidermis is neatly segmented into stripes of anterior and posterior compartments. During zipping, a precise matching of cells according to their positional identity along the anterior-posterior body axis takes place. Filopodia were implied in guiding the cell-cell recognition process. Recent large-volume electron tomography data of a whole reconstructed zipping site revealed the presence of a significant, single lamellar overlap structure. One aim of this thesis was to test whether the organization of these overlapping lamellae points towards a specific recognition mechanism. In particular, we wanted to visualize the left-right as well as the up-down organization of overlapping lamella in respect to the compartment identities and test for an occurring pattern.

To that means, by combining the powers of two different imaging modalities, I established correlative light and electron microscopy. The analysis of eight individual zipping sites revealed a specific pattern of overlapping lamella for the majority of samples. Dependent on the compartment identity and a left-right axis, anterior cells from the left side protruded underneath opposing anterior cells, whereas posterior cells from the left side protruded over posterior cells from the right side. These observations give evidence for an additional importance of a left-right asymmetry ensuring proper cell-cell recognition during zipping.