Life Sciences Seminar

An integrin-mediated adhesion between embryonic tissue and vitelline membrane affects gastrulation of insects

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Host: Carl-Philipp Heisenberg

Gastrulation is a critical step during the development of multicellular organisms in which a single-layered tissue folds into a multi-layered germband. This shape change is characterized by tissue folding and large-scale tissue flow. The myosin-dependent forces that underlie this process have been increasingly investigated; however, thus far, the possible interaction between the moving tissue and the rigid shell surrounding the embryo has been neglected. In this talk, I will present our quantitative findings on the physical mechanisms governing gastrulation in the red flour beetle (Tribolium castaneum). We investigated the forces expected within the tissue given the myosin distribution observed by multi-view light-sheet microscopy and discovered that an additional external force must be counteracting this tissue-intrinsic contractility. We then identified that a specific part of the tissue tightly adheres to the outer rigid shell. This attachment is mediated by a specific integrin (Inflated) whose knock-down leads to a complete loss of the counter-force. Moreover, in the fruit fly (Drosophila melanogaster) knock-down of another integrin (Scab) leads to a severe twist of the germband, suggesting that the integrin-mediated interaction between tissue and vitelline envelope may be an important mechanism that contributes a thus far unknown force to gastrulation movements in insects in general.

Friday, July 19, 2019 03:00pm - 04:30pm
IST Austria Campus Mondi Seminar Room 2, Central Building

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