Seminar/Talk

"Inorganic polyphosphates in plants: sensor domains, metabolic enzymes... and an unsuspected bicistronic mRNA".

Laura Lorenzo Orts
University of Geneva

Host: Carl-Philipp Heisenberg

Polyphosphates (polyPs) are linear polymers formed by orthophosphate subunits linked by high-energy phosphoanhydride bonds. While polyPs exist in all domains of life (from bacteria to humans), their presence in plants is not yet confirmed. We identified plant proteins with structural homology to polyP-metabolizing enzymes. One of them, TTM3, cleaves tripolyphosphate molecules into pyrophosphate and orthophosphate. My work reveals that TTM3 is expressed together with the CELL DIVISION CYCLE PROTEIN 26 (CDC26) from a bona fide bicistronic mRNA that is conserved in the entire plant lineage. CDC26 is part of the plant anaphase promoting complex and its deletion impairs embryo development. While TTM3 enzymatic activity seems dispensable, TTM3 translation coordinates CDC26 expression by targeting the transcript into polysomes. Hence, the bicistronic configuration of the CDC26-TTM3 mRNA allows fine-tuning of CDC26 expression and suggests a functional connection between polyP metabolism and the cell cycle. Furthermore, a protein from Ricinus communis was found to harbor a domain of unknown function named CHAD. In bacteria, CHAD domains are often found in operons encoding polyP-metabolizing enzymes. My work demonstrates that CHAD from all domains of life bind polyPs with high affinity and specificity. Interestingly, CHAD localizes in the nucleus and nucleolus of plant cells, suggesting the existence of a polyP pool in these compartments. Based on our biochemical and structural analysis, CHAD may be used as a molecular tool to detect polyPs in cells and tissues.

Monday, June 3, 2019 11:00am - 12:15pm
Meeting room 2nd floor / Bertalanffy Bldg. (I04.2OG - LAB)

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