

We invite you to a lecture

Stress management in plant cells:

Live imaging aided insights on subcellular behaviour and interactions



by

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Sequestration of function forms the basis for the presence of myriad organelles within a eukaryotic cell. Nevertheless, a living cell relies on interactivity and efficient co-operation between the different organelles to formulate a response designed to minimize the harmful effects of a stress and ensure cell survival. Classic transmission electron microscopy-based images of plant cells, often presented with superimposed biochemical and molecular evidence, strongly suggest that interactivity may be enhanced through increased proximity between organelles. Notably, the TEM images are of fixed, dead cells and thus do not accurately reflect the dynamic nature of subcellular interactions in living plant cells.

Over the past three decades my lab has investigated mechanisms involved in maintenance of homeostasis in plant cells responding to stress. Our major goal to look at sub-cellular events occurring inside living plant cells utilizes a variety of transgenic plants expressing genetically encoded, organelle-targeted fluorescent proteins. Our comprehensive, live-imaging based observations and data analysis have revealed intricate, dynamic and often transient phenomena occurring in plant cells. Insights include the tremendous flexibility in organelle morphology, including the sporadic formation of thin, tubular organelle-extensions into the cytoplasm. We have established that while all organelles remain well-separated from each other, they all maintain intimate connectivity with the endoplasmic reticulum (ER), the largest continuous membrane bound system in a cell. The formation of transient membrane contact sites (MCS) greatly augments exchanges between different organelles and the ER. Notably, ER dynamics and organization respond rapidly to diverse stresses and the effect is directly translated to altering the behaviour and output of enmeshed organelles. Recent work that strongly suggests the formation of transient ER micro-domains as a common mechanism facilitating interactivity of functionally discrete organelles to ensure homeostasis in plant cells exposed to abiotic and biotic stresses will be presented.

Further reading: < <u>https://mathurlab.github.io/publications.html</u> >

When: July 3, 2025, 14:00

Where: Institute of Experimental Botany (Rozvojová 263, 165 02 Praha 6 – Lysolaje)

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