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"Pathogen effectors as probes to study plant processes"

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To enable parasitism and symbiosis, plant-associated organisms intimately interact with plant cells often through specialized cellular structures. For example some fungal and oomycete pathogens form accommodation structures termed haustoria that invaginate the host cell plasma membrane to deliver pathogenicity effector proteins and acquire nutrients. In response, the attacked plant cell synthesizes a new membrane surrounding the haustoria called the extrahaustorial membrane (EHM), which differs from plasma membrane in various aspects. Moreover, the plant cell undergoes significant cellular reorganization involving organelle relocation and polarized secretion of anti-microbial molecules at contact sites. As a countermeasure effective pathogens such as the oomycete pathogen *Phytophthora infestans* secrete effector proteins that target the EHM and neutralize such innate resistance responses. However, the composition of the EHM and the mechanisms underlining its biogenesis are still poorly understood. The role of focal secretion in immunity has been difficult to dissect using standard genetic approaches because mutants often show pleiotropic effects that perturb plant development. As an alternative approach we focused on unraveling the mechanisms underlying EHM biogenesis by using live imaging techniques and effectors as molecular probes that mark distinct membrane compartments within haustoriated plant cells. These experiments revealed rerouting of vacuolar trafficking towards the EHM. We confirmed the dynamic nature of this process by showing that, upon activation, a cell surface immune receptor traffics to the EHM via the endocytic late endosome route. In summary our work indicates that effectors can be used as molecular probes to unravel unknown facets of focal immunity and reveals dynamic processes that recruit membrane compartments to a host-pathogen interface.