

Membrane trafficking in plant cells attacked by powdery mildew fungi

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We are interested in plant membrane trafficking processes and how they are involved in plant interactions with microbes. For this purpose we use the powdery mildew fungi and the attacked leaf epidermal cells, which are amenable for confocal microscopy. These fungi are obligate biotrophs, introducing haustoria in the host cell as a means of acquiring nutrients.

We have previously shown that PEN1 and GNOM, a syntaxin and an ARF-GEF, function on the same pathway defending the cell against penetration and haustoria establishment. We have more recently obtained data showing that components of multivesicular body formation and secretion of exosomes are involved as well. Pathogen haustoria are surrounded by plant-generated membranes. The nature of these extrahaustorial membranes (EHM) remains enigmatic. We have addressed this question and found that the powdery mildew-associated EHM in barley cells shares features with the endoplasmic reticulum membrane (ER), although the EHM is not an extension of the ER. A defence component, which is often observed but poorly studied, is the haustorial encasement. Here a cell wall-like structure forms around the haustorium. We have uncovered a Rab GTPase required for encasement formation and for the first time been able to document that it suppresses pathogen proliferation.