1.

Do different metabolite profiles (more specifically different plant genotypes conferring different levels of metabolites) within a populaiton confer differential levels of herbivore resistance. Do the different metabolite profiles, or plant genotypes, allow populations to maintain resitance to mutliple herbivores over time and in response to changing stimuli?

- Would be an induction experiment using multiple herbivores; Slugs, catterpillars, pea aphids, and control wounding.

- This study would be looking at the Tou-A population from France.

2.

How are secondary metabolites produced by the plant affecting the metabolism and growth of bacterium in the microbiome? Is there indication that the plant itself is shaping the microbiome by the expression of certian metabolites in order to constrict the community structure?

-*The plant defense signal galactinol is specifically used as a nutrient by the bacterial pathogen Agrobacterium fabrum.* Meyer et al. 2018

- I am not sure how the methodology will work for this particular idea, but it could be a mixture of growing sterile plants and innoculating them with specific pathogenic bacteria along with recording secondary metabolite levels. This research would reside in the phyllosphere and would ignore the root system of the plants for the analysis – unless there is a need for it to be used.

3.

How chemosensing between pathogens within the microbiota can affect the behavior and structure of the microbe community through *in vitro* studies. Does the presense of certian pathogens cause others in the community to respond, does this repsonse help or hinder the bacterium, and can this be modelled using networks.

- This would be an in vitro study of different organisms which resides in the microbiome to test if the expression of different chemicals produced by pathogens have an effect on the community as a whole.