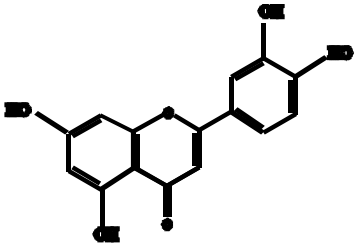
Long Lab: Biochemistry of plant-microbe signals

Background:

- Rhizobium bacteria establish beneficial symbioses with plant hosts in the legume family.
- A complex and specific developmental process occurs to form a plant root ***nodule*** infected by bacteria. Both partners undergo marked differentiation during nodule development.

Primary Questions:

- How do the eukaryote and prokaryote recognize each other? We have characterized chemical signals for early steps of interaction: plant *flavonoids* and bacterially produced Nod factors (modified oligosaccharides) but other stages are not understood.
- What regulates the expression of bacterial genes in the symbiosis?
- How does the plant recognize and transduce the bacterial signals?



Systems:

- Sinorhizobium meliloti, a symbiont in the alpha-proteobacteria
- Medicago truncatula, a diploid model legume related to alfalfa

Approaches:

- bacterial and plant - forward genetic screens, reverse genetics
- genomic analysis and transcription studies
- GFP tagging of plant + bacterial proteins, confocal microscopy
- natural products chemistry
- in vitro transcription, protein purification, modeling, mutational analysis