アドバンス生命理学特論
Topics in Advanced Biological Science

日　時：12月5日（火）15：30－17：00
場　所：理学部E館1階　E131号室

Session #1

Department of Biochemistry, University of Missouri-Columbia, U.S.A.

Prof. Scott C. Peck

"New Insights into the Basis of Innate Immunity in Plants"

Plants perceive potential pathogens by recognizing pathogen-associated molecular patterns (PAMPs) through plasma membrane (PM) receptors. Recognition of flg22, a 22 amino acid PAMP derived from the bacterial flagellum, by the receptor-like kinase FLS2 induces defense signaling responses and contributes to innate immunity by restricting bacterial invasion. We have developed quantitative phosphoproteomic technology to identify novel Arabidopsis proteins that are rapidly phosphorylated following PAMP treatments, and using reverse genetics, we have defined functions for a number of these candidates in innate immune responses.

Plant recognition of potential bacterial pathogens initiates the rapid deployment of defenses, thereby preventing colonization. Much of what is known about plant resistance against bacteria involves production of and response(s) to salicylic acid (SA). However, SA-independent mechanisms of resistance are known to exist but have been poorly defined. We found that the enhanced resistance of the MAP kinase phosphatase 1 (mkp1) mutant in Arabidopsis is genetically independent of SA production and signaling, providing possible insights into SA-independent mechanisms. We previously reported that resistance in mkp1 involves the restriction of plant chemical signals used by virulent bacteria to induce of their type III secretion system (TTSS), and we also reported that this mechanism appears to be shared with PAMP-triggered immunity (PTI; Anderson et al., 2014). Because PTI, like the resistance in mkp1, previously has been found to be independent of SA, we examined if – and confirmed that – PTI restriction of effector delivery was also independent of SA. These results provide a simple explanation of a mode of SA-independent resistance that can be rapidly activated before SA production is initiated.

Anderson et al (2014) Decreased abundance of type III secretion system-inducing signals in Arabidopsis mkp1 enhances resistance against Pseudomonas syringae. *PNAS* 111:6846-6851.

Session #2

Department of Botany and Plant Pathology, Oregon State University, U.S.A.

Asst. Prof. Jeffrey C. Anderson

"Inter-Kingdom Communication: Regulation of Pseudomonas syringae Virulence by Host Plant-derived Metabolite Signals"

My laboratory is working to understand how the plant pathogenic bacterium Pseudomonas syringae uses host-derived metabolites as chemical cues to deploy its virulence-promoting type III secretion system (T3SS). Using a large-scale genetic screen we recently identified multiple P. syringae genes required for perception of host metabolites leading to T3SS gene expression, including predicted receptors, transporters and transcriptional regulators. We are currently characterizing the role of these genes in perceiving host signals and regulating virulence. On the plant side, we hypothesize that extracellular release of virulence-promoting metabolites is regulated during a plant immune response, possibly as a means to limit pathogen growth. Using biochemical and metabolomic approaches, we identified several T3SS-inducing metabolites that are exuded from immune-activated plant cells at decreased levels. These results, as well as progress towards defining a possible role of these metabolites in limiting bacterial growth, will be presented.

世話人：吉岡博文（生命農学研究科）hyoshiok@agr.nagoya-u.ac.jp
多田安臣（遺伝子実験施設）ytada@gene.nagoya-u.ac.jp