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PrhA controls a regulatory pathway required for the specific induction of *Pseudomonas syringae hrp* gene cluster

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Pseudomonas syringae is a plant pathogenic bacterium which has the host specificity. The *hrp* gene cluster of *P. syringae* and *Ralstonia solanacearum* is key pathogenicity determinant; It encodes the type III secretion system involved in the secretion of mediators of the bacterium-plant interaction. It is induced in plants, but no plant inducers of *hrp* gene expression have been characterized so far. *hrp* gene cluster is most strongly expressed in various minimal media that mimic plant apoplastic fluids, and in several cases the level of induction found in plants in comparable to that observed in the synthetic medium. However, recent studies provide evidence that specific plant factor induce *R. solanacearum hrp* gene cluster expression. Upon co-culture with tomato cell suspensions, the expression of the regulatory *hrpB* gene is induced up to 20-fold more than in minimal medium. This specific plant cell induction of *hrp* gene cluster is controlled by PrhA, a protein that shows homology to outermembrane siderophore receptors. PrhA was proposed to act as a receptor for a plant-derived signal and appears to activated a specific plant-dependent pathway controlling the induction of *R. solanacearum hrp* gene cluster. In this study, we amplified *prhA* gene of *P. syringae* pv. *tabaci* by PCR and constructed Δ*prhA* mutant by allelic exchange. In several physiological examination, PrhA mutant strain differed from wild type. Mutant strain exhibited reduced virulence in host plant. We postulated that PrhA of *P. syringae* is putative pathogen-plant cell contact sensor and used *hrpA*::*gfp* promoter fusion to demonstrate that PrhA is a pathogen-plant cell contact sensor.

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Identification of Quorum Sensing Quenching Novel Materials in Natural Products

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Cell density-dependent signal transduction, quorum sensing (QS), involves in the synthesis and detection of low molecular-weight molecules known as autoinducers. Inhibitors of bacterial quorum sensing systems offer potential treatment of infections with highly virulent or multidrug-resistant agents.

We studied the inhibition effecters on autoinducers which are induced by *Pseudomonas syringae* pv. *tabaci* ATCC 11528. *P. syringae* pv. *tabaci* produced two autoinducers which were detected their ability by using an *Agrobacterium tumefaciens* NT1 biosensor strain containing a *traI*::*lacZ* fusion. The novel materials which quenched quorum sensing system were purified the fraction of 108min peak from cabbage, leek and onion in recycling preparative HPLC. The common fraction quenched the quorum sensing of *A. tumefaciens* NT1 biosensor strain in ABMM containing X-gal. The common fraction did not inhibit the growth of *A. tumefaciens* NT1. So the novel materials in natural products are estimated a kind of antagonists. We are now studying on the structure of common fraction which are purified from natural products by GC, LC-MS and NMR.