S001 S-locus receptor kinase signaling in the Brassicaceae

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Allele-specific interactions between highly-polymorphic *S* locus-encoded receptors and ligands control the discrimination between "self" and "non-self" pollen by the stigma in the self-incompatibility response of the Brassicaceae. The S-locus receptor kinase SRK, which is displayed at the surface of the stigma epidermis, is only bound and activated by its cognate ligand, the small S-locus cysteine-rich protein SCR, which is localized in the pollen coat. The SRK-SCR interaction triggers a poorly understood signaling cascade within the stigma epidermal cell that culminates in inhibition of pollen tube emergence or growth.

To aid in analysis of self-incompatibility, we developed an *Arabidopsis thaliana* transgenic self-incompatible model by transformation with functional *SRK-SCR* gene pairs isolated from *A. lyrata* or *Capsella grandiflora*. Our molecular genetic analysis of these transformants has elucidated several features of the recognition and response phases of self-incompatibility. *In planta* analysis of a large number of engineered receptor variants led to the identification of residues required for SRK function and those required for its ligand-selective activation. A reverse genetics strategy suggested that regulation of SRK catalytic activity and orchestration of the SI response in *Arabidopsis* do not use the regulators or signaling components that have been implicated in *Brassica* self-incompatibility. And a forward genetic approach uncovered unexpected linkages between inhibition of "self" pollen at the stigma surface and pistil development, suggesting that S-locus receptor-mediated signaling was co-opted from a receptor-based developmental signaling pathway.