Structure of the activated ROQ1 resistosome directly recognizing the pathogen effector XopQ

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Plants and animals detect pathogen infection via intracellular nucleotide-binding leucine-rich repeat receptors (NLRs) that directly or indirectly recognize pathogen effectors and activate an immune response. How effector sensing triggers NLR activation remains poorly understood. Structure-function studies of these complexes are hampered by low levels in native tissue, our inability to express them recombinantly, and their instability in solution. We overcame sample limitation problems and solved a 3.8 Å resolution cryo-EM structure of the activated ROQ1, an NLR native to N. benthamiana with a Toll-like interleukin-1 receptor (TIR) domain, bound to the Xanthomonas effector XopQ. ROQ1 directly binds to both the predicted active site and surface residues of XopQ while forming a tetrameric resistosome that brings together the TIR domains for downstream immune signaling. Our results suggest a mechanism for the direct recognition of effectors by NLRs leading to the oligomerization-dependent activation of a plant resistosome and signaling by the TIR domain.

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