

Endofungal bacterium controls its host by an hrp type III secretion system.

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Abstract

Burkholderia rhizoxinica and *Rhizopus microsporus* form a unique symbiosis in which intracellular bacteria produce the virulence factor of the phytopathogenic fungus. Notably, the host strictly requires endobacteria to sporulate. In this study, we show that the endofungal bacteria possess a type III secretion system (T3SS), which has a crucial role in the maintenance of the alliance. Mutants defective in type III secretion show reduced intracellular survival and fail to elicit sporulation of the host. Furthermore, genes coding for T3SS components are upregulated during cocultivation of the bacterial symbiont with their host. This is the first report on a T3SS involved in bacterial-fungal symbiosis. Phylogenetic analysis revealed that the T3SS represents a prototype of a clade of yet uncharacterized T3SSs within the hrp superfamily of T3SSs from plant pathogenic microorganisms. In a control experiment, we demonstrate that under laboratory conditions, rhizoxin production was not required for establishment of the symbiotic interaction.

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