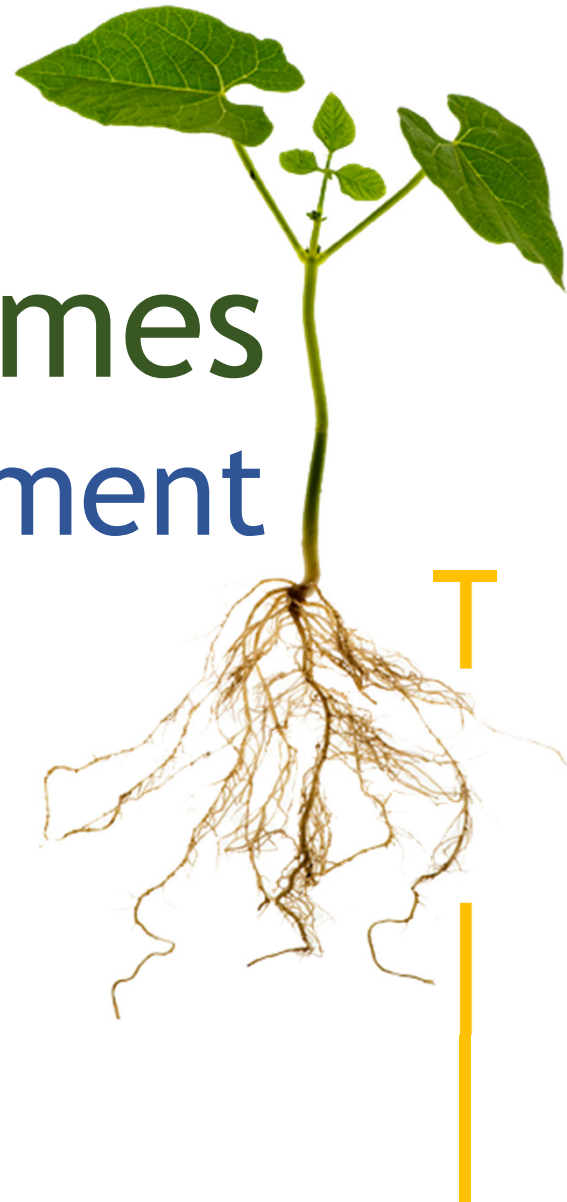


Microbiomes for soil improvement

[Rodrigo Mendes | November 2021]

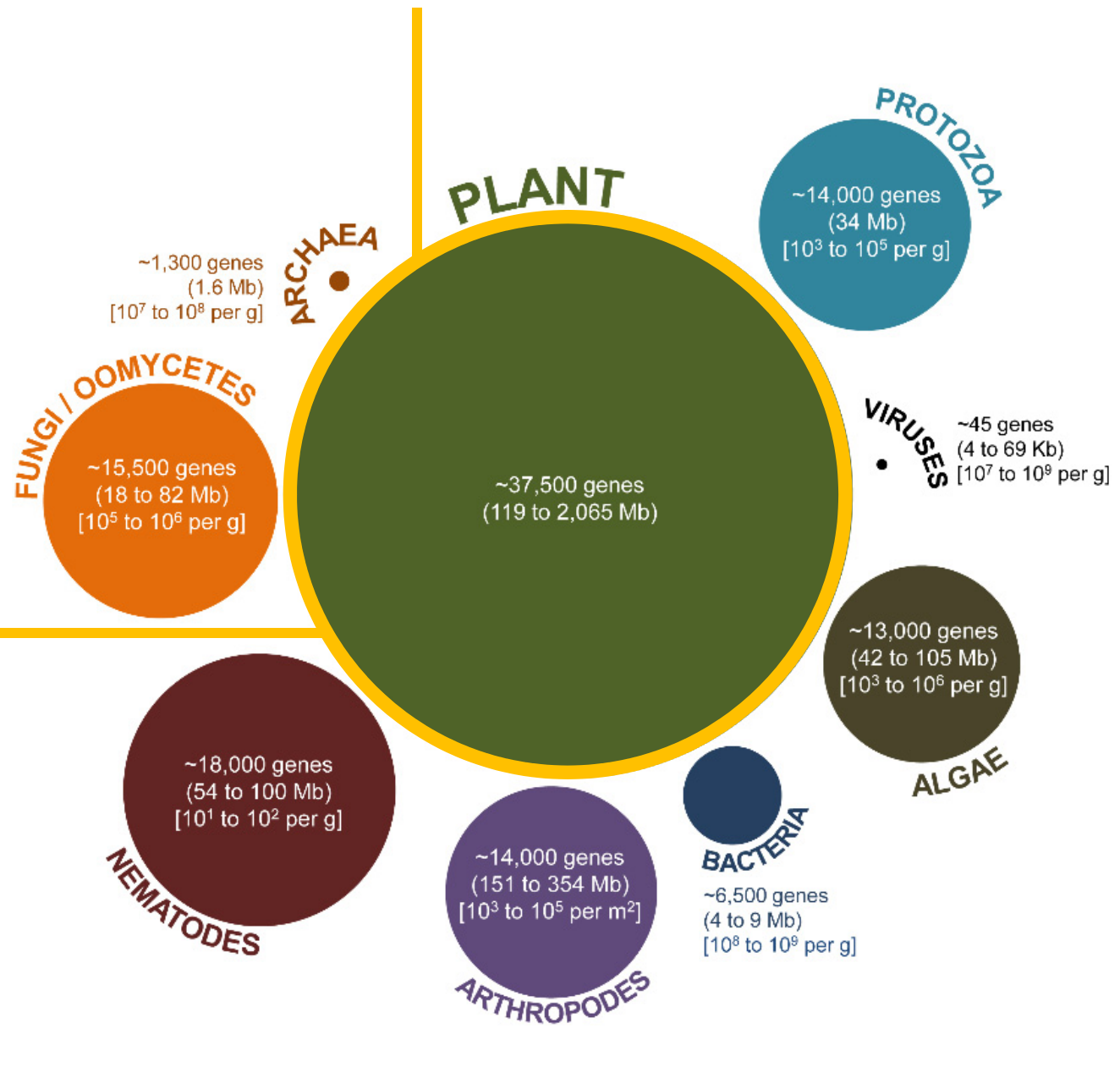


“The defense strategy favored by selection pressure imposed on plants by soil borne pathogens may well be the ability of plants to support and respond to rhizosphere microorganisms antagonistic to these pathogens.”



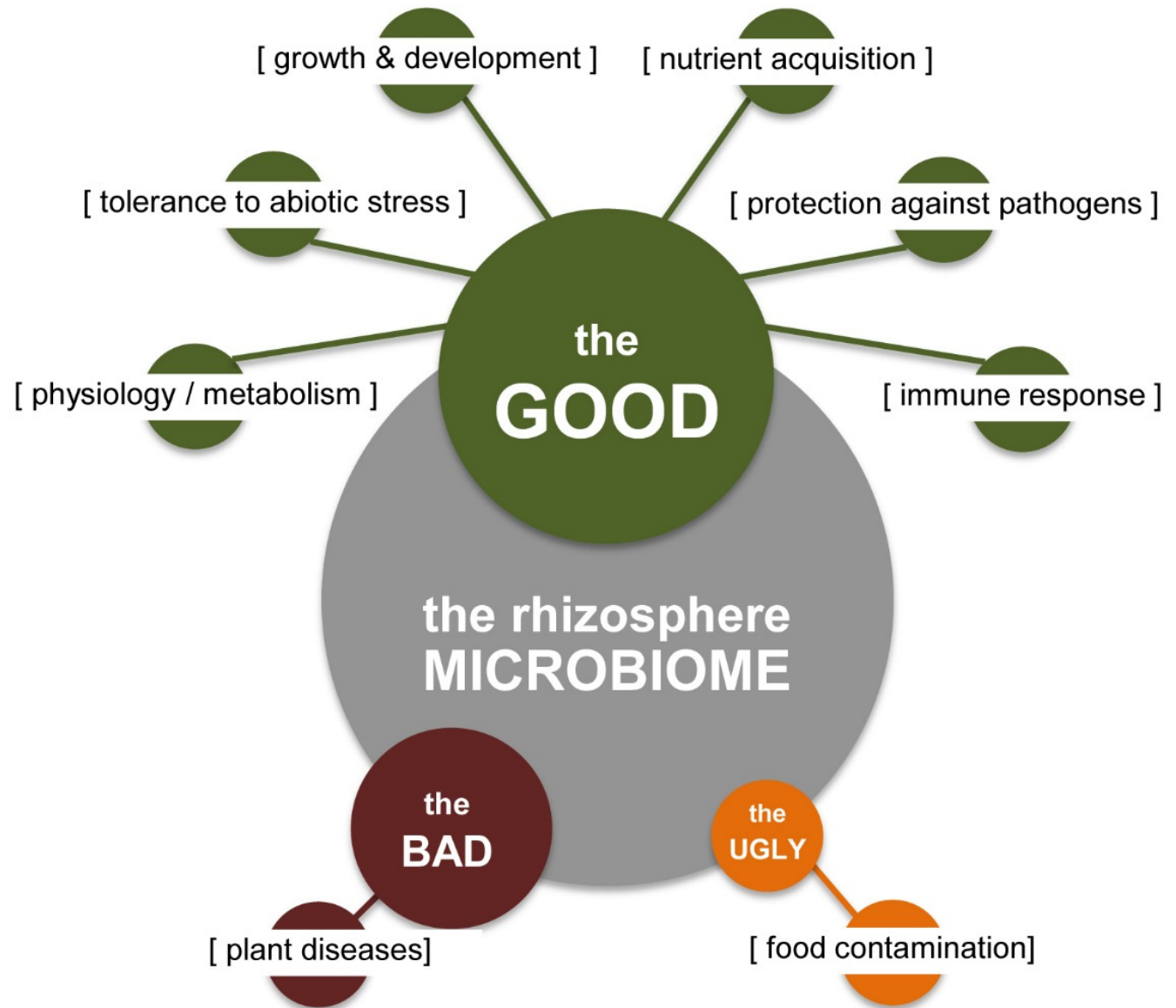
Prof. James Cook | Washington State University

[Cook et al., PNAS 1995]

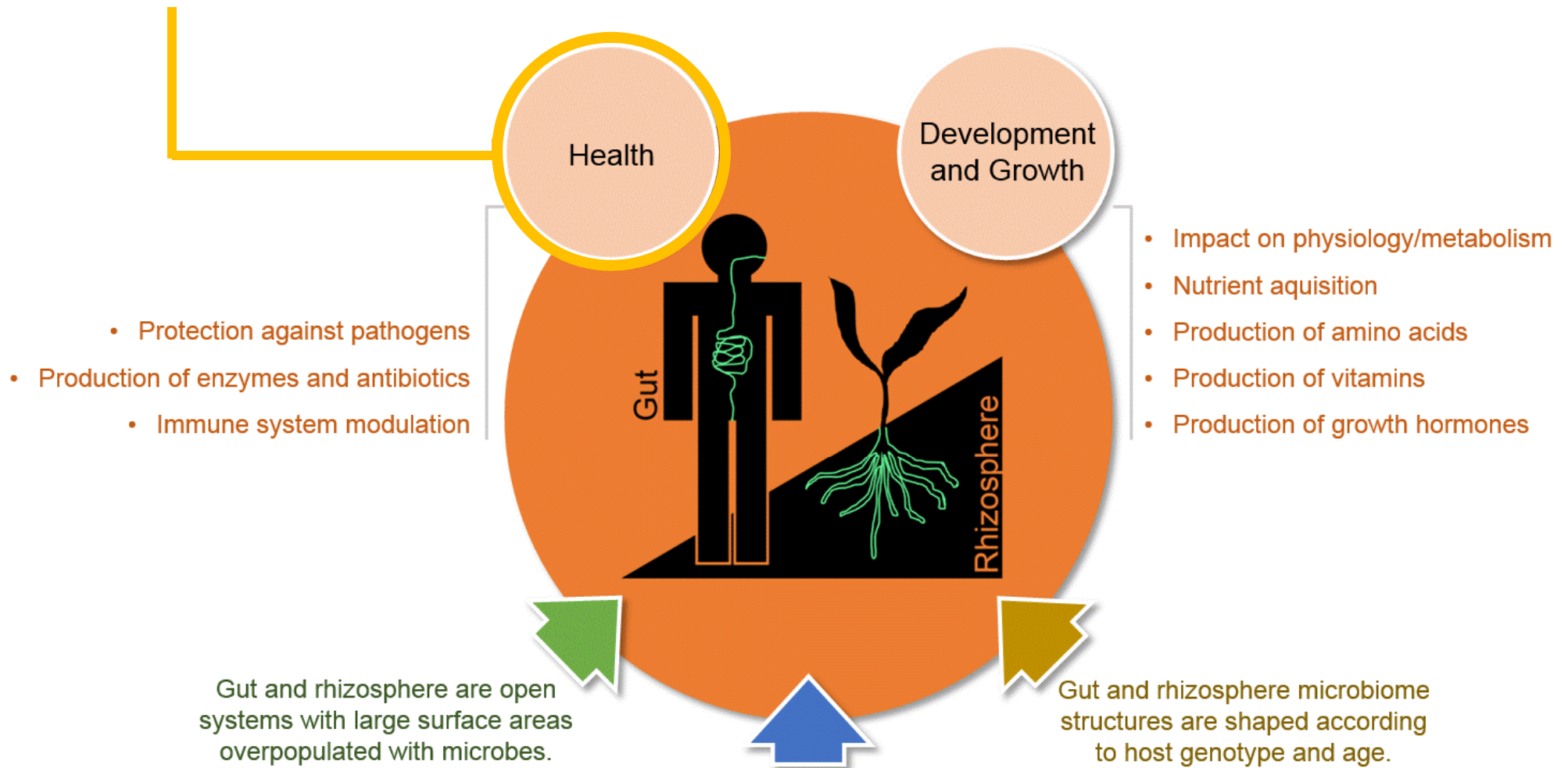


The rhizosphere microbiome: significance of plant beneficial, plant pathogenic, and human pathogenic microorganisms

[Mendes et al., FEMS Microbiol Rev 2013]

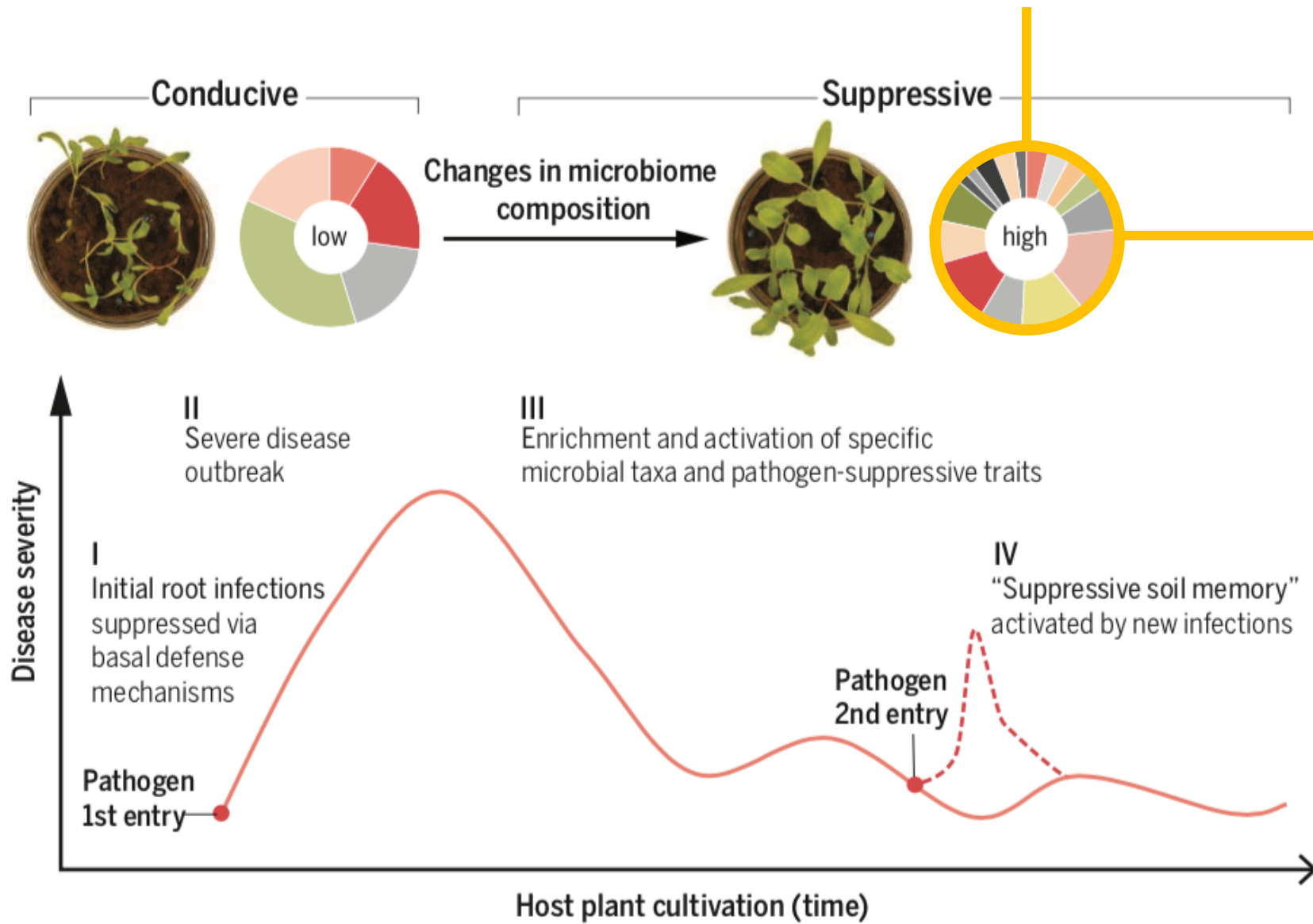


[Mendes et al., FEMS Microbiol Rev 2013]



Cross-kingdom similarities in microbiome functions

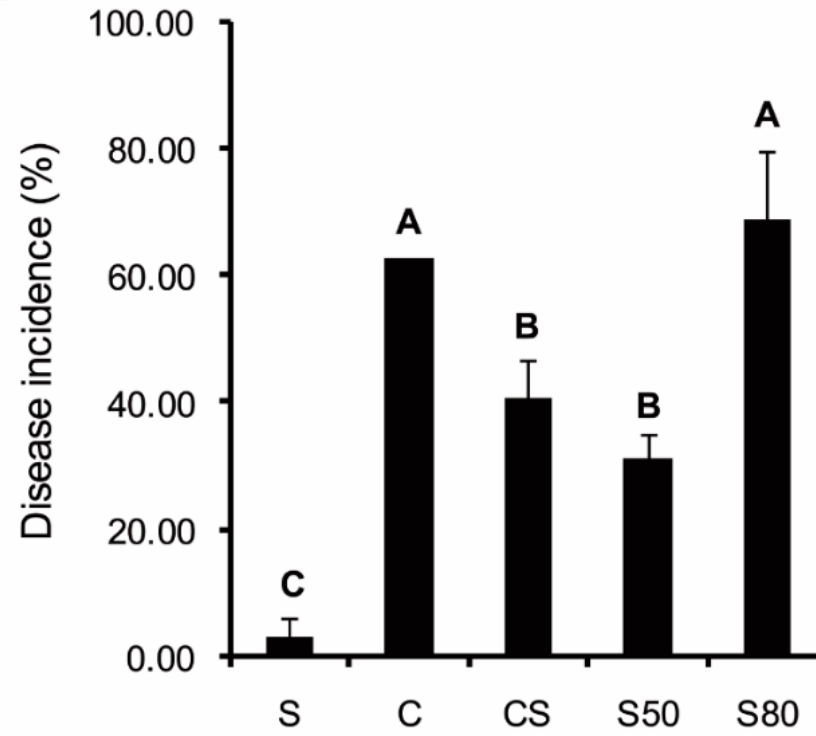
[Mendes & Raaijmakers, ISME J 2015]



A



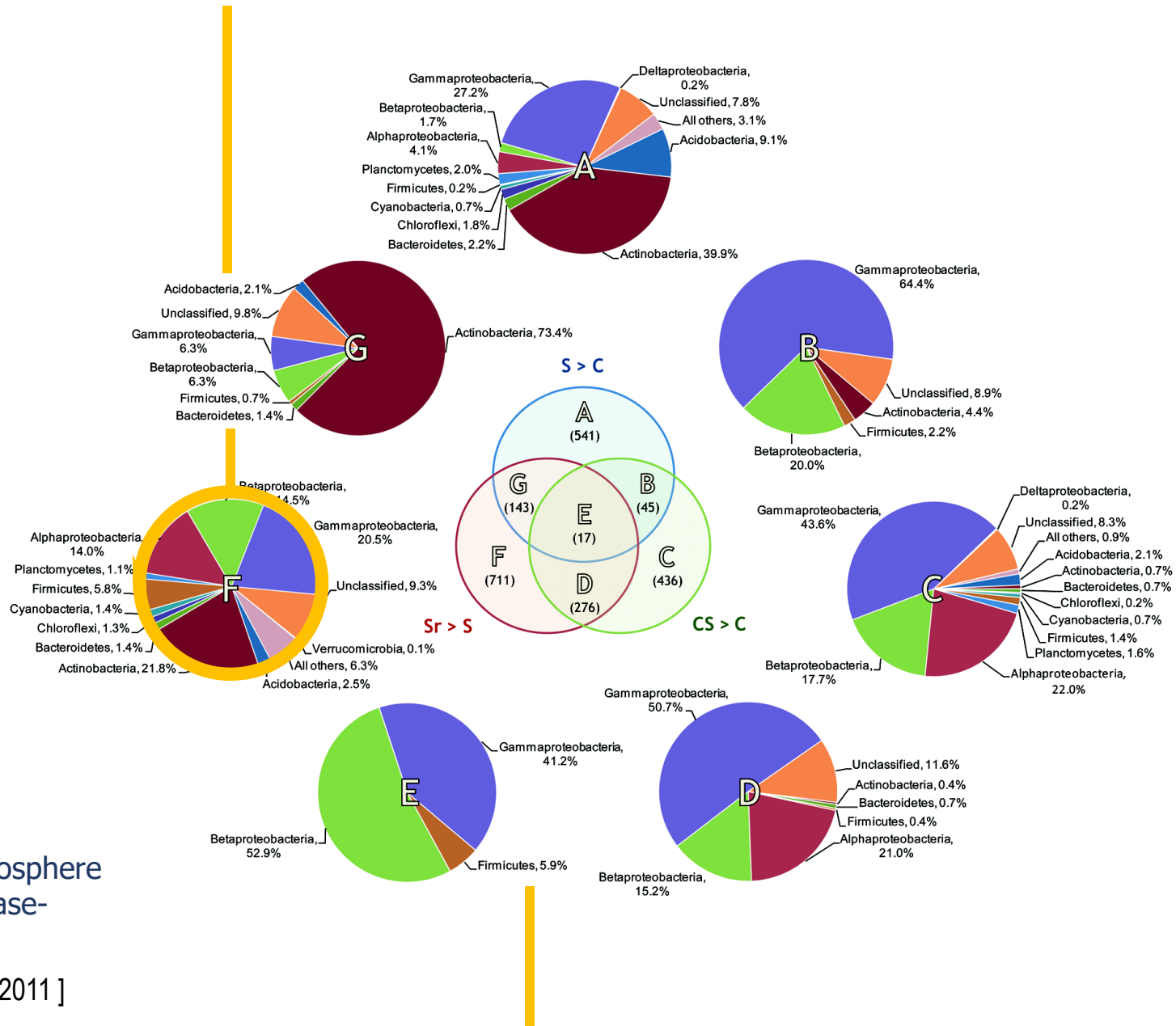
B



Deciphering the rhizosphere
microbiome for disease-
suppressive bacteria

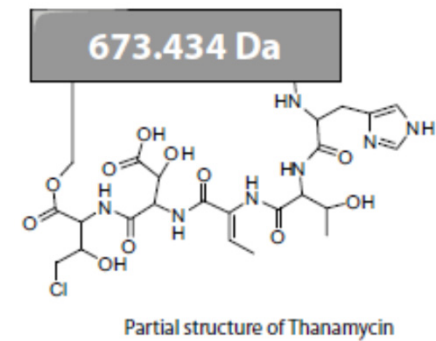
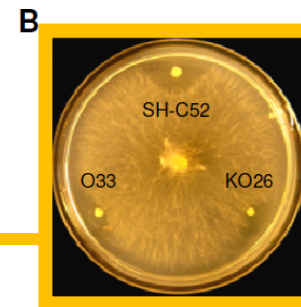
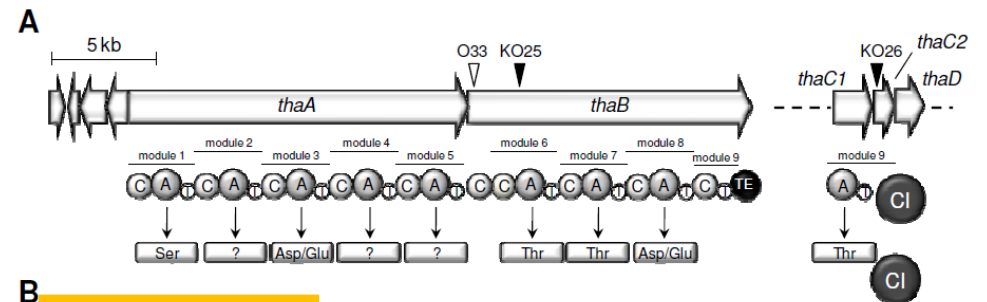
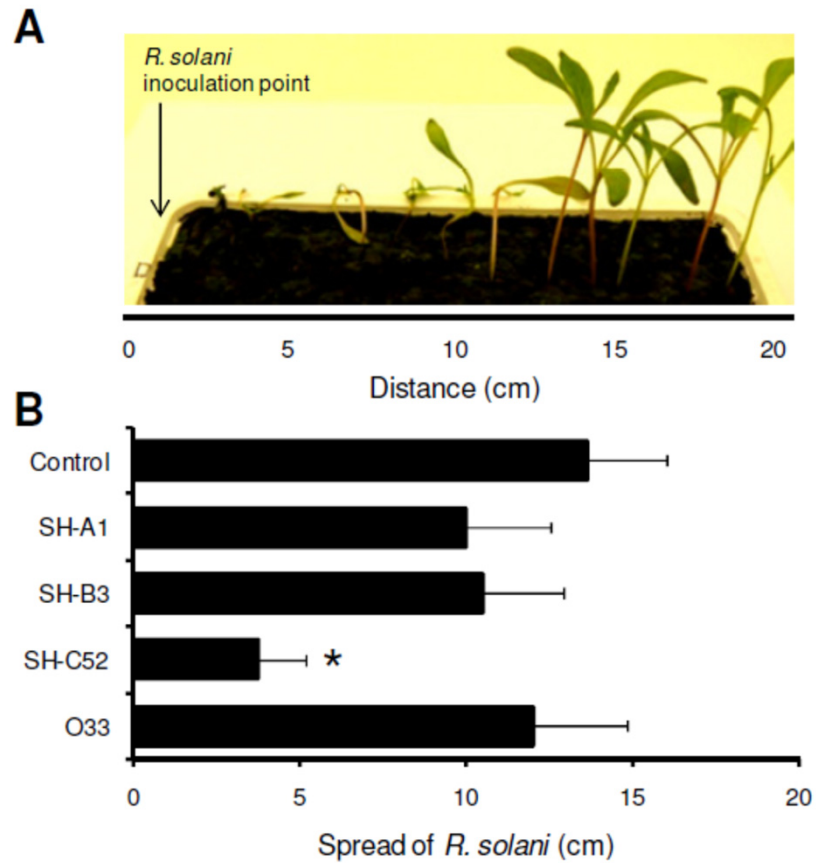
[Mendes et al., Science 2011]



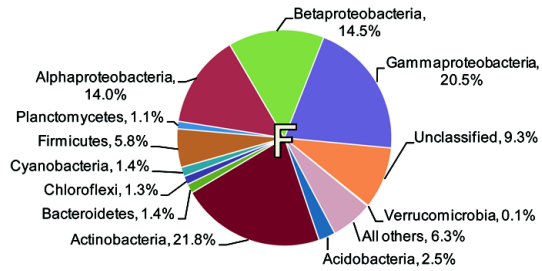


Deciphering the rhizosphere microbiome for disease-suppressive bacteria

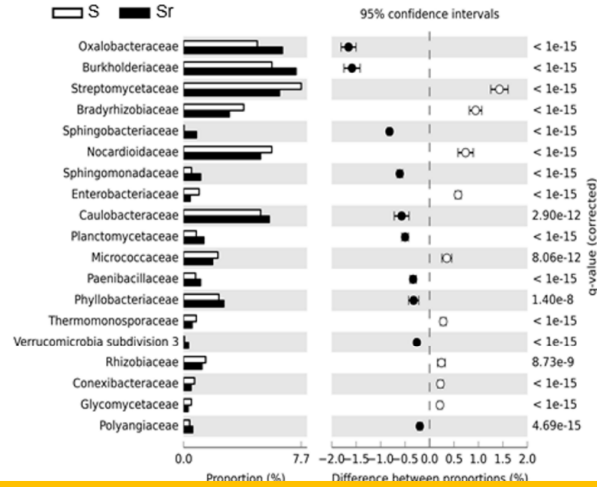
[Mendes et al., Science 2011]



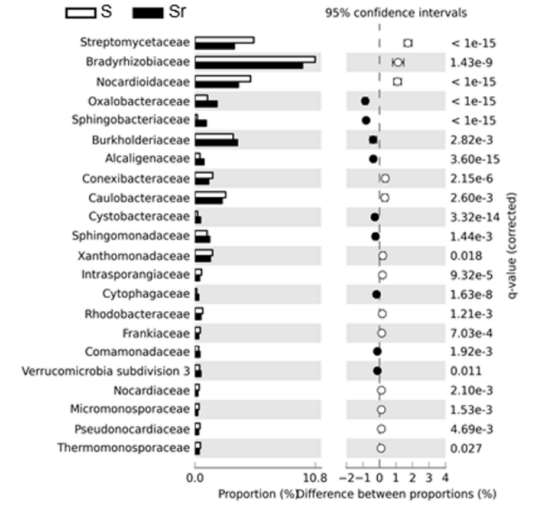
[Mendes et al., Science 2011; see also Wastrous et al., PNAS 2012 and Voort et al., Frontiers in Microbiology 2015]



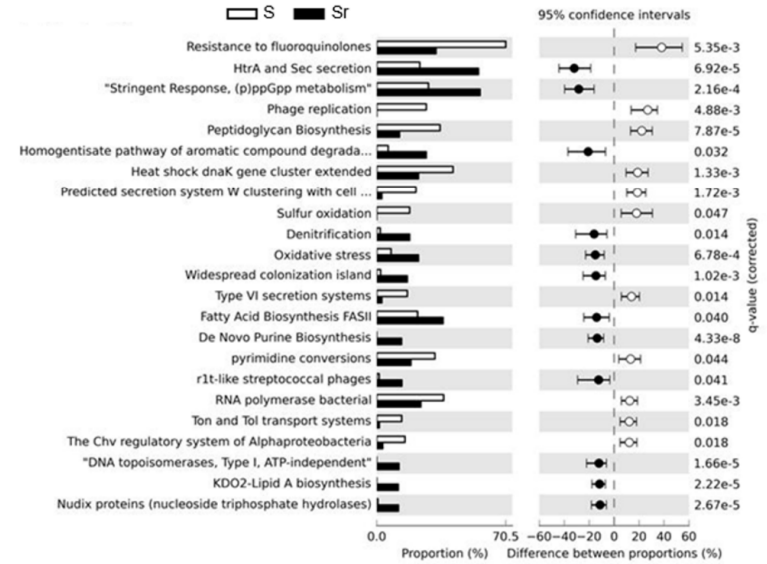
A rRNA (taxonomy)



B mRNA (taxonomy)



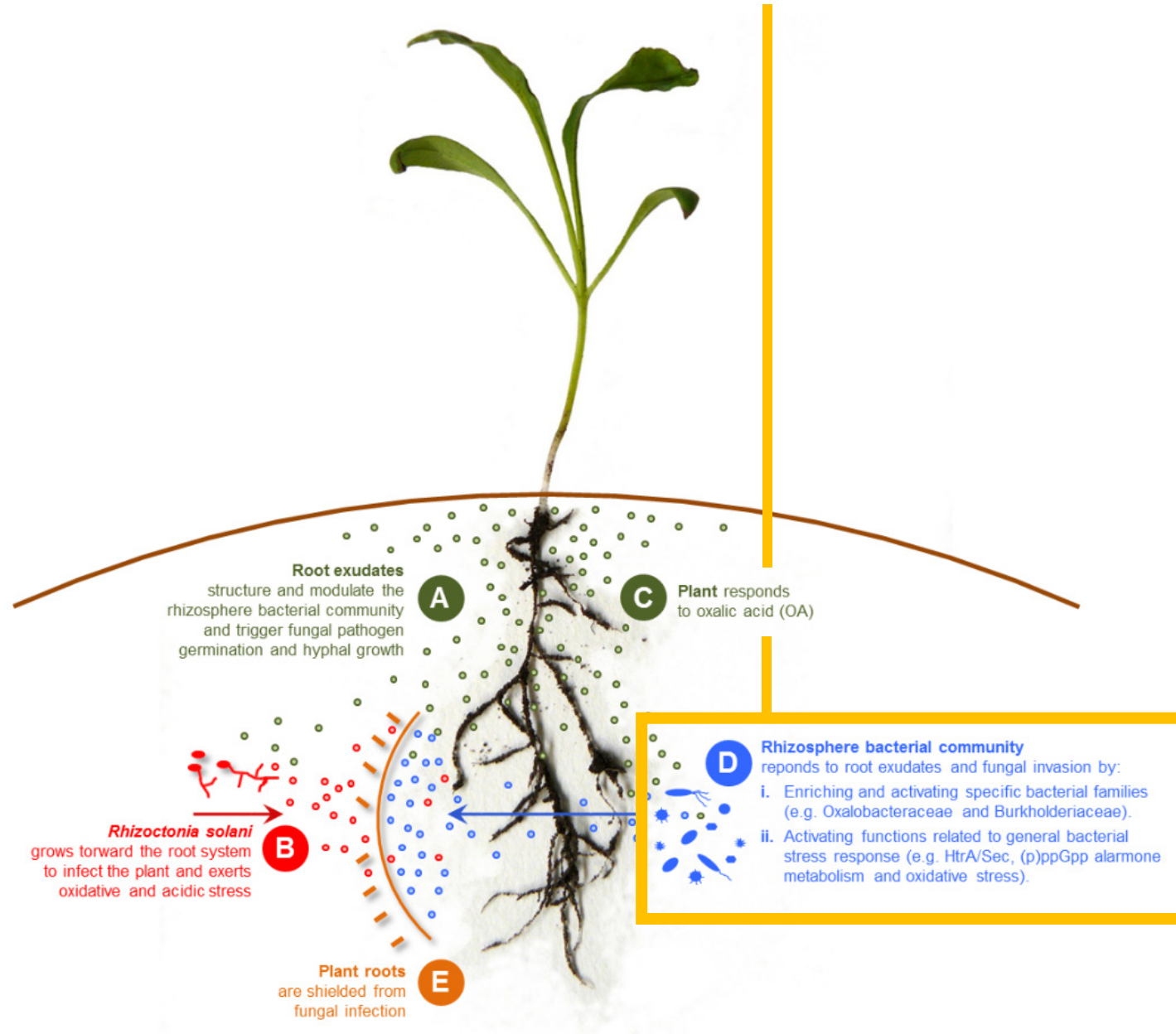
C mRNA (functions)



Fungal invasion of the rhizosphere microbiome

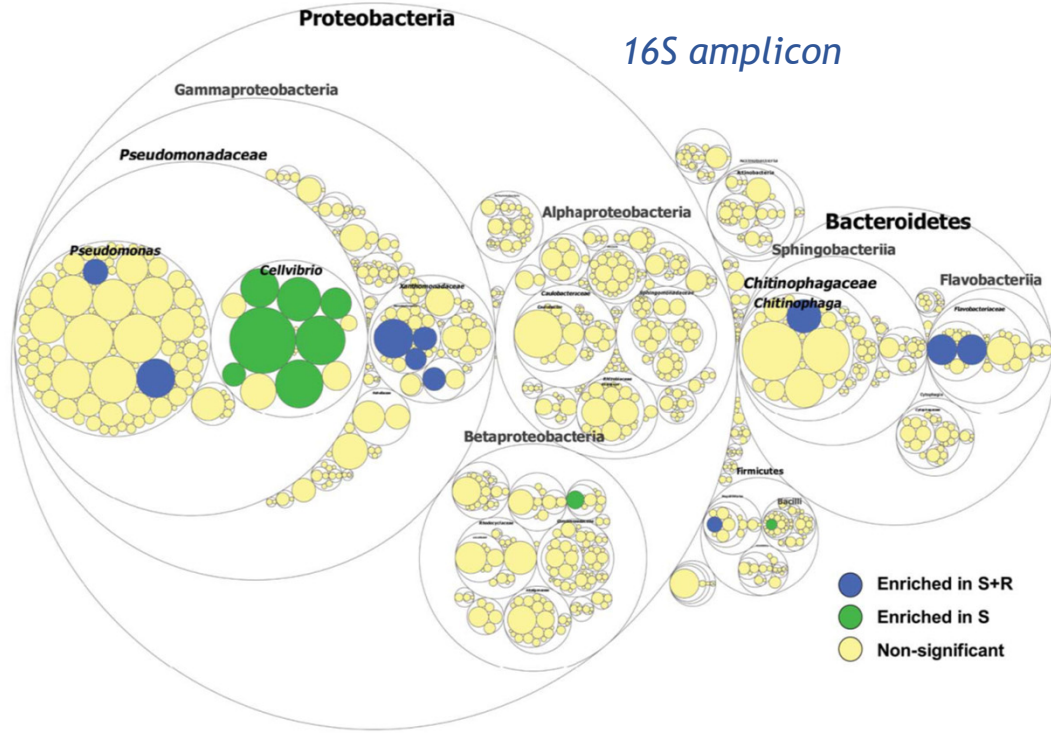
[Chapelle et al., ISME J 2016]

Metataxonomics (16S RNA)
Metagenomics (DNA)
Metatranscriptomics (RNA)

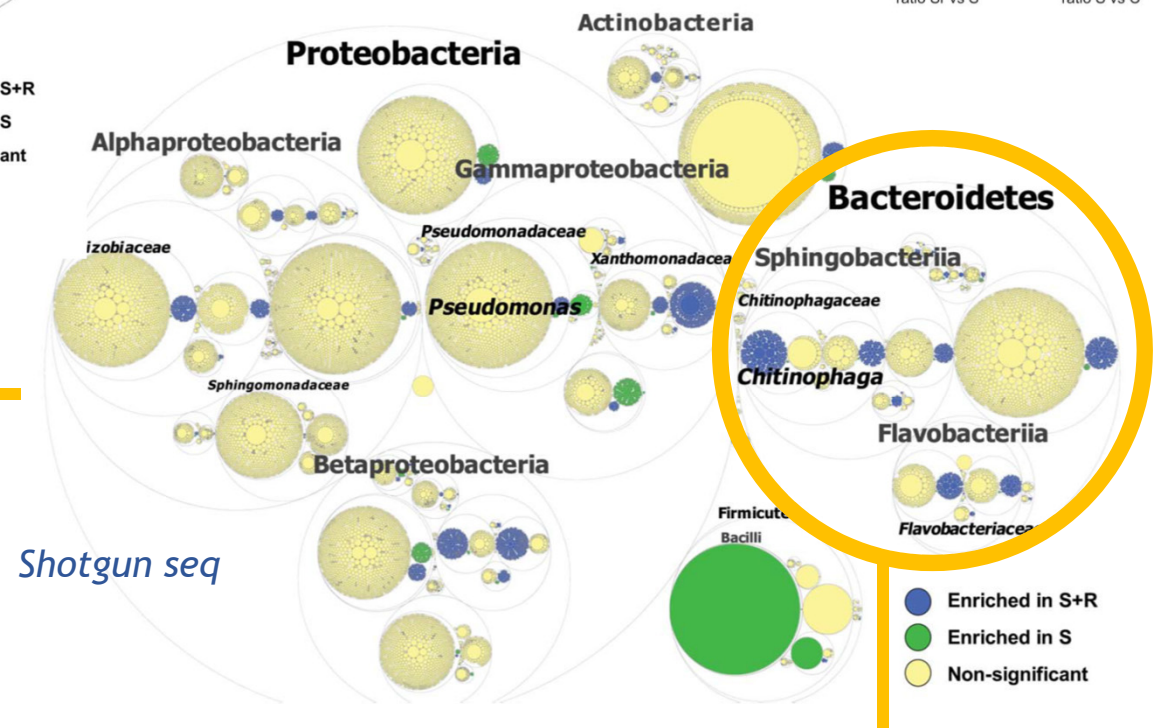
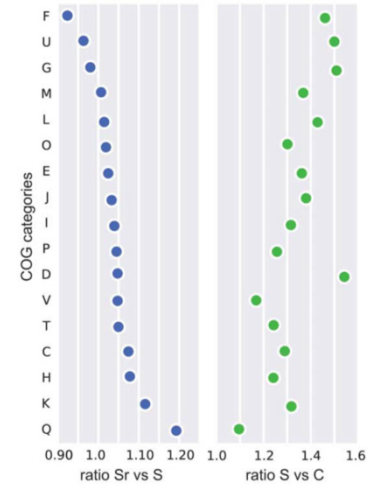


Fungal invasion of the rhizosphere microbiome

[Chapelle et al., ISME J 2016]



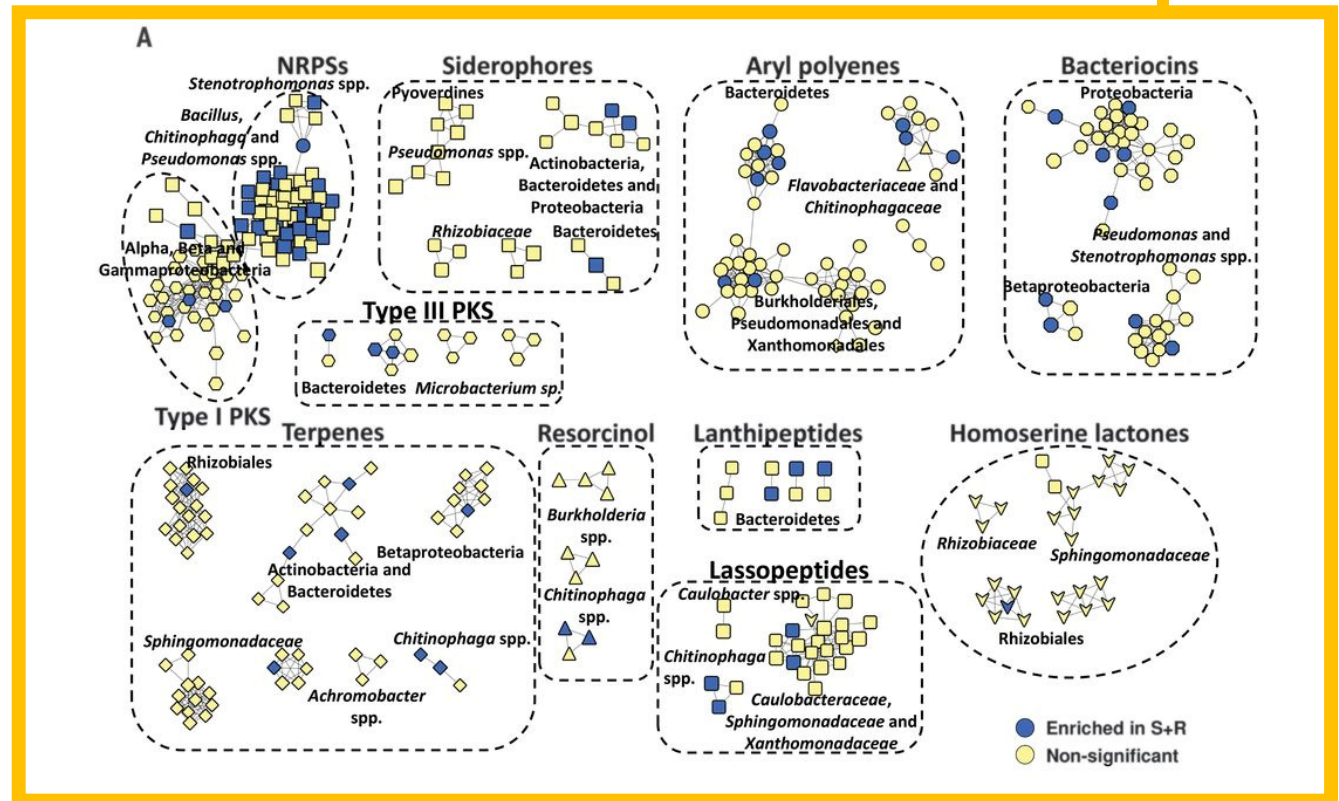
Functions



Pathogen-induced activation of disease-suppressive functions in the endophytic root microbiome

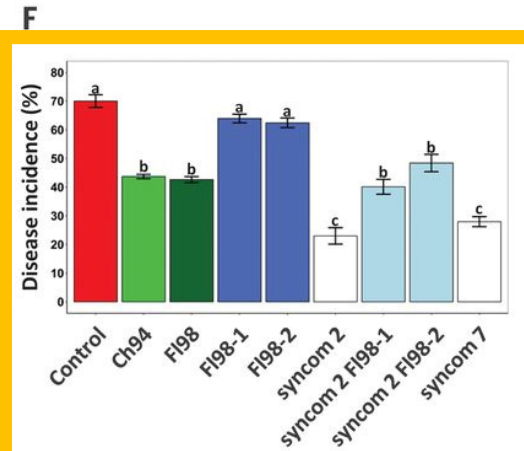
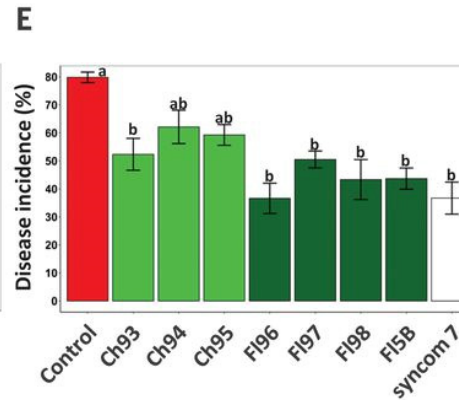
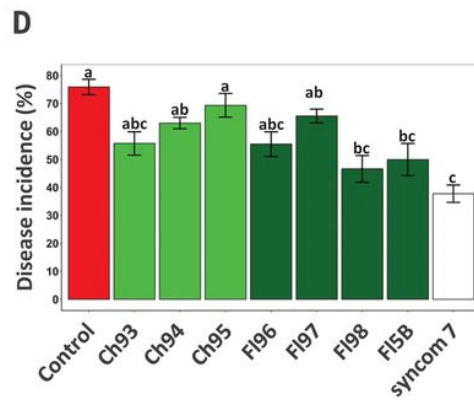
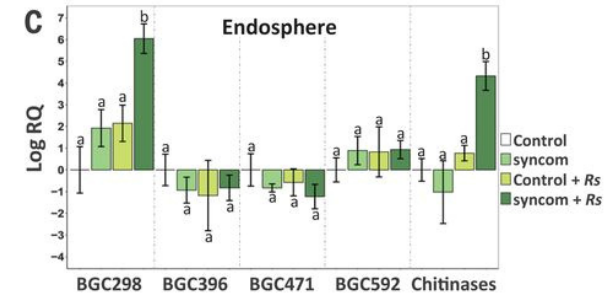
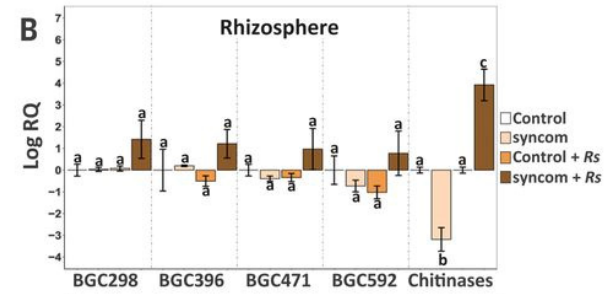
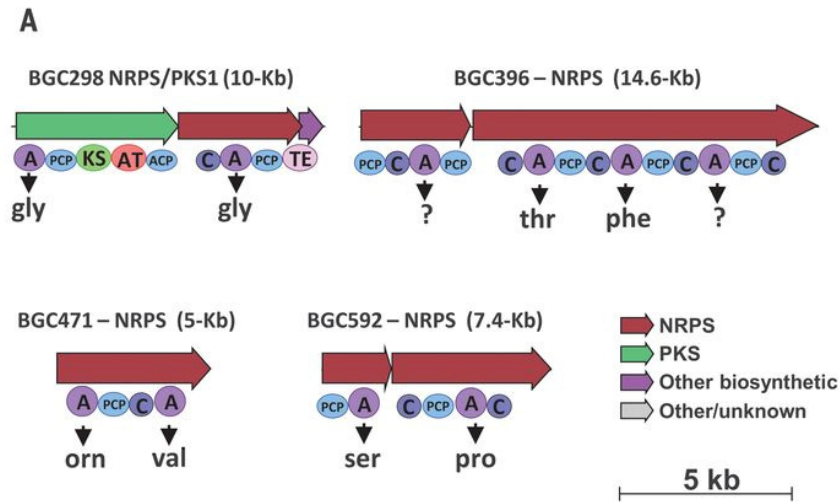
[Carrion et al., Science 2019]

From the 730 BGCs identified in the metagenome by antiSMASH, only 12 have previously been described and the chemical structure of their products elucidated.



Pathogen-induced activation of disease-suppressive functions in the endophytic root microbiome

[Carrion et al., Science 2019]



*Rhizosphere and Endosphere:
first and second microbiological layers
of plant defense*

Deciphering the rhizosphere
microbiome for disease-
suppressive bacteria

[Mendes et al., Science 2011]

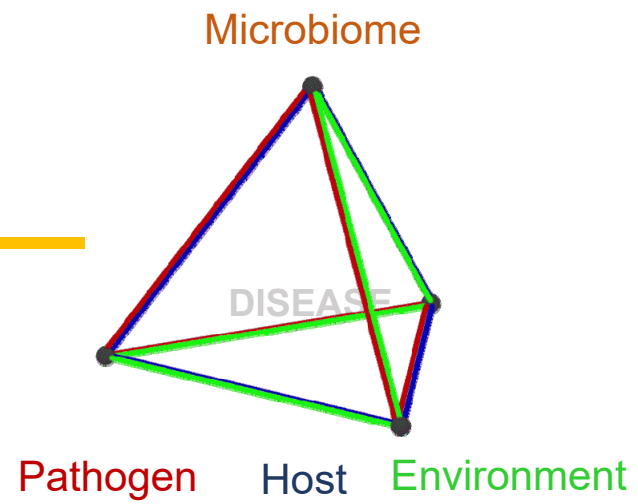
Fungal invasion of
the rhizosphere
microbiome

[Chapelle et al., ISME J 2016]

Pathogen-induced activation of disease-
suppressive functions in the endophytic
root microbiome

[Carrion et al., Science 2019]

[disease pyramid]





thanks!



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