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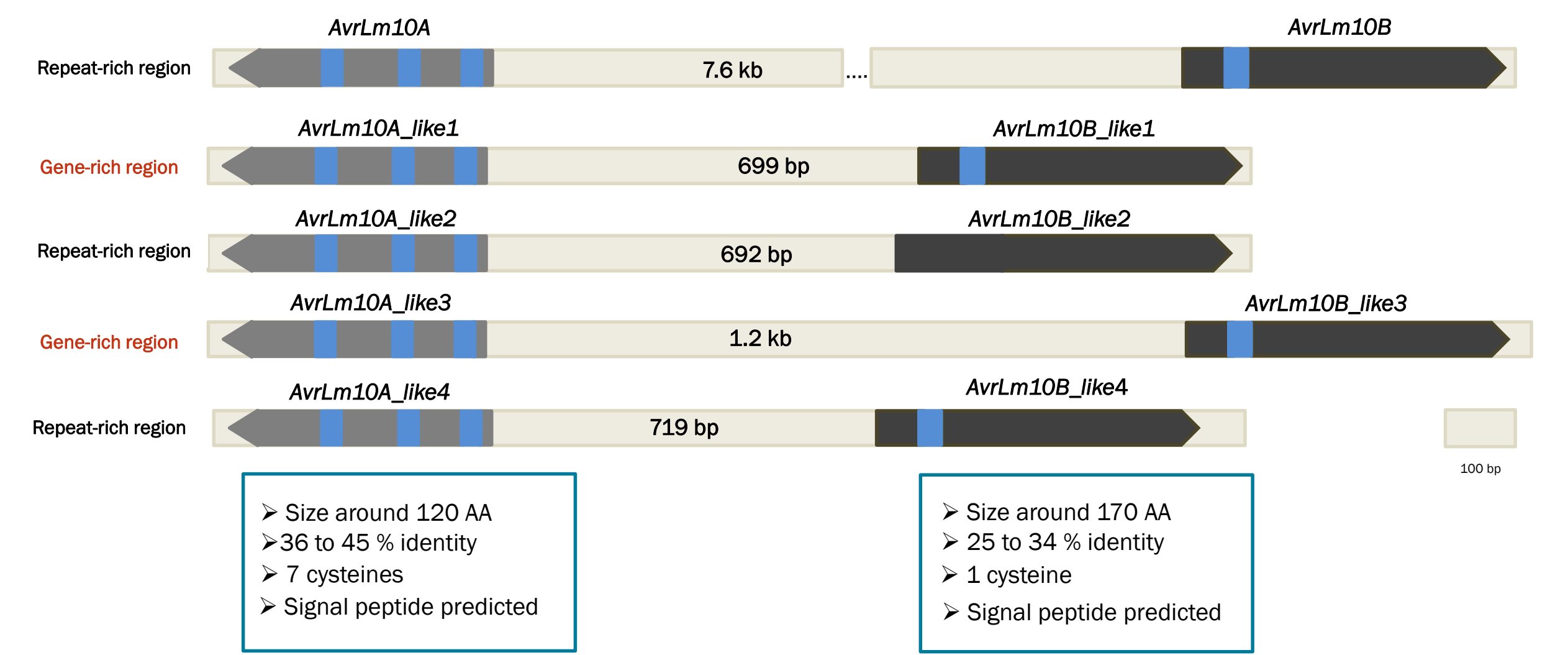
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Identification of a large multigene family of cooperating effector genes facilitating cell-to-cell mobility conserved in Dothideomycetes and Sordariomycetes

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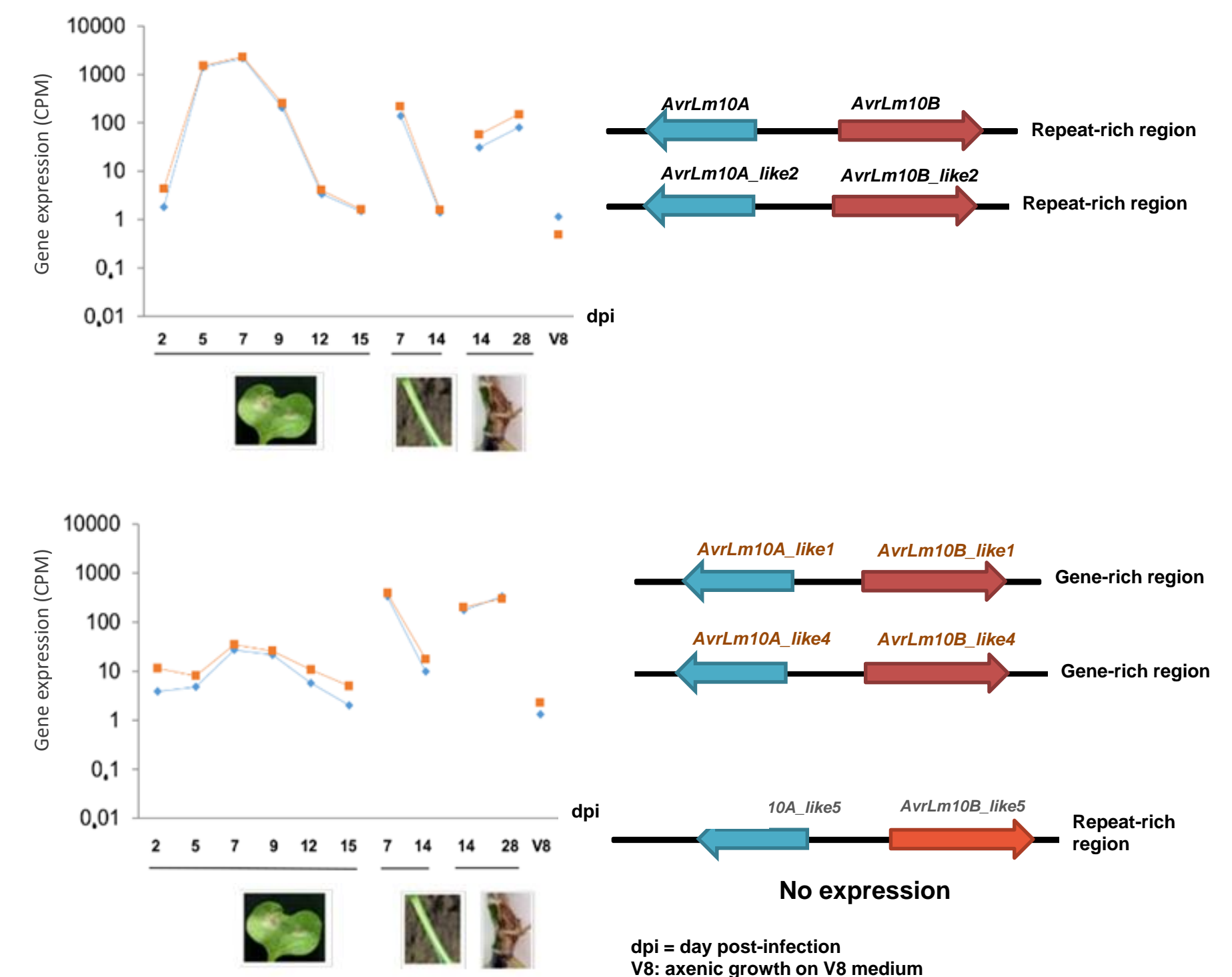
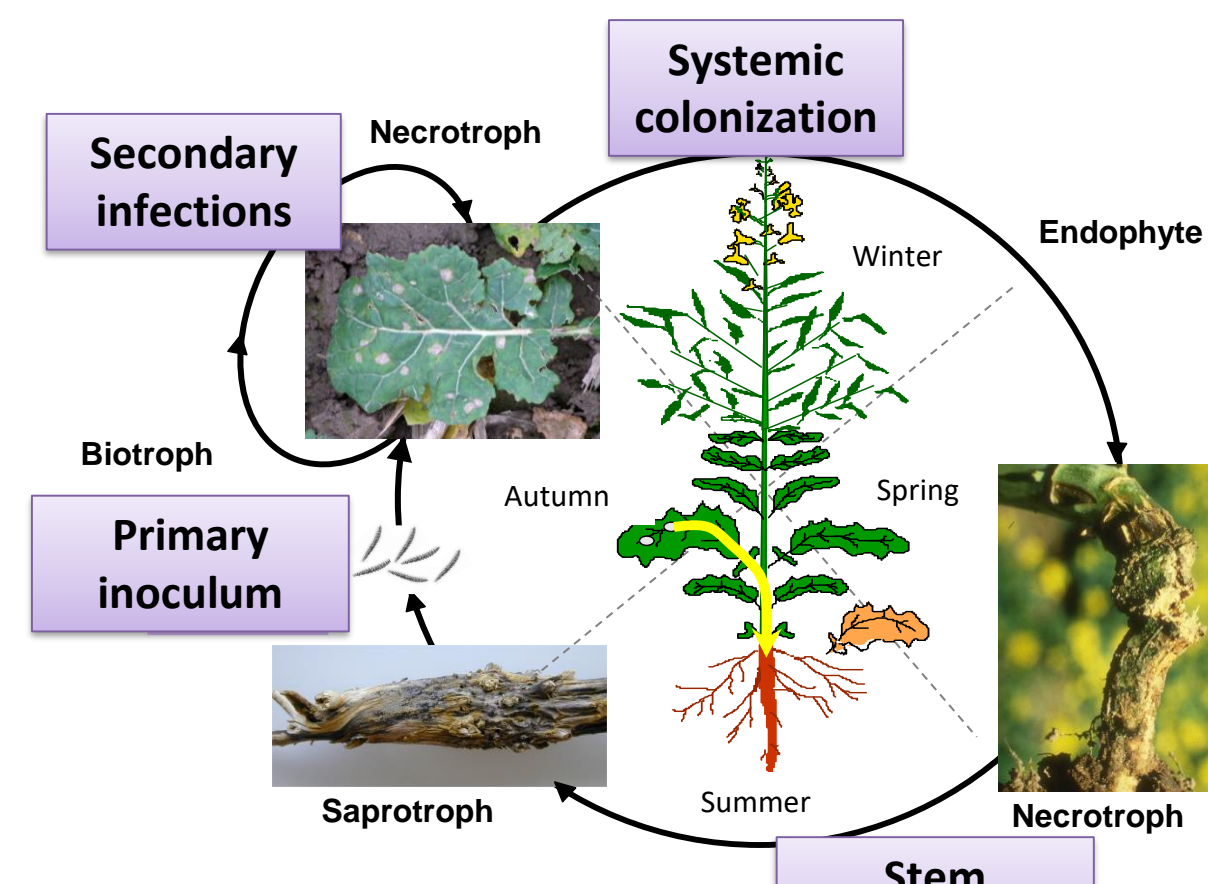
1. AvrLm10A and AvrLm10B avirulence effectors of *Leptosphaeria maculans* are part of a multigene family



Two avirulence effectors, *AvrLm10A* and *AvrLm10B*, of *Leptosphaeria maculans*, responsible for stem canker of oilseed rape, are members of a family of conserved effectors. *AvrLm10A* and *AvrLm10B* are neighboring genes in divergent transcriptional orientation both necessary to induce recognition by the resistance protein of *Brassica nigra* Rlm10 (Petit-Houdenot et al., 2019). *AvrLm10A* and *AvrLm10B* physically interact. Sequence searches within the *L. maculans* genome showed that *AvrLm10A/AvrLm10B* belong to a multigene family comprising five pairs of genes with similar tail-to-tail organization (Talbi et al., 2023)

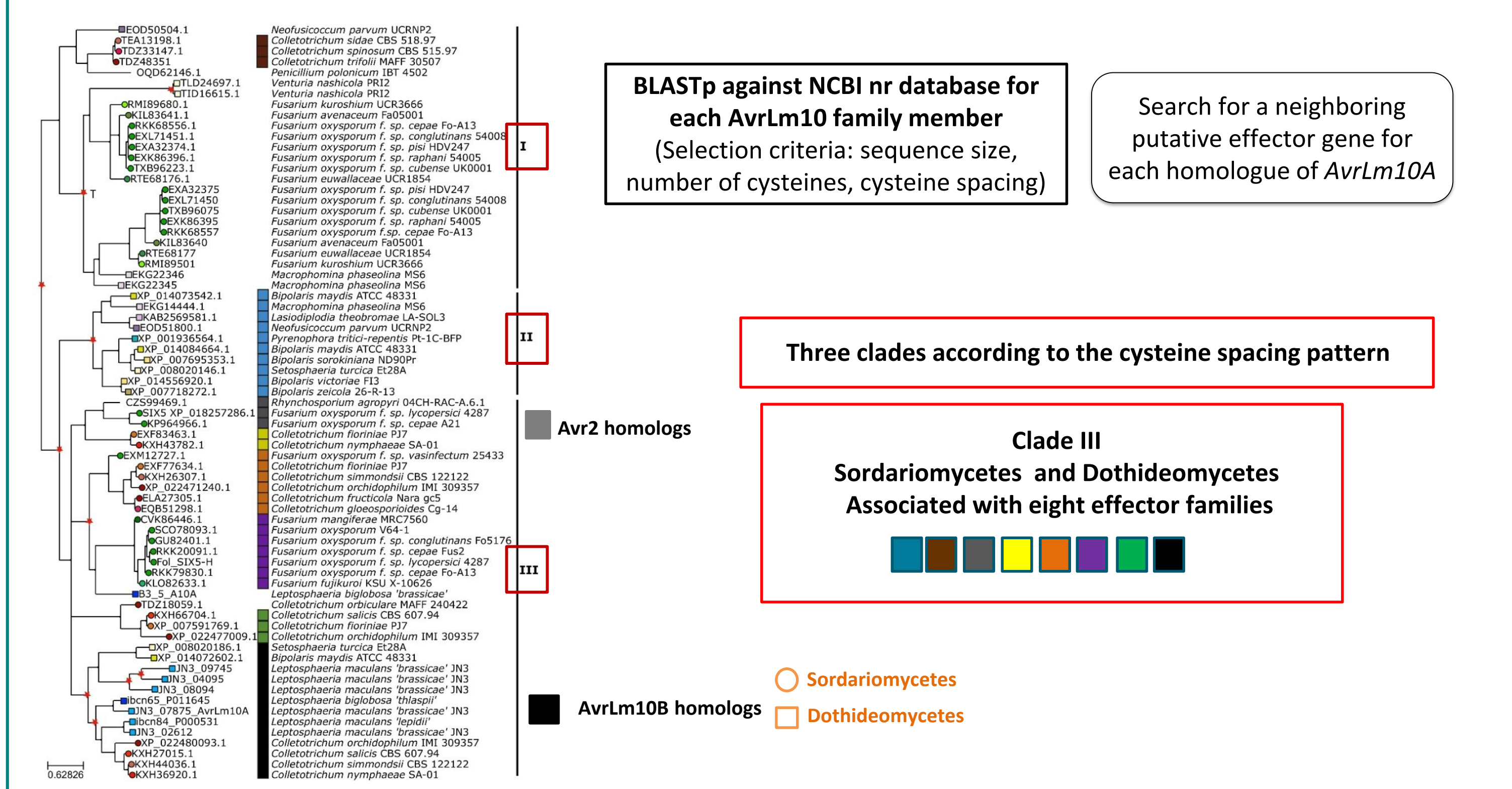
Objective: Characterize the AvrLm10 effector family

2. Expression kinetics of the AvrLm10 effector gene family



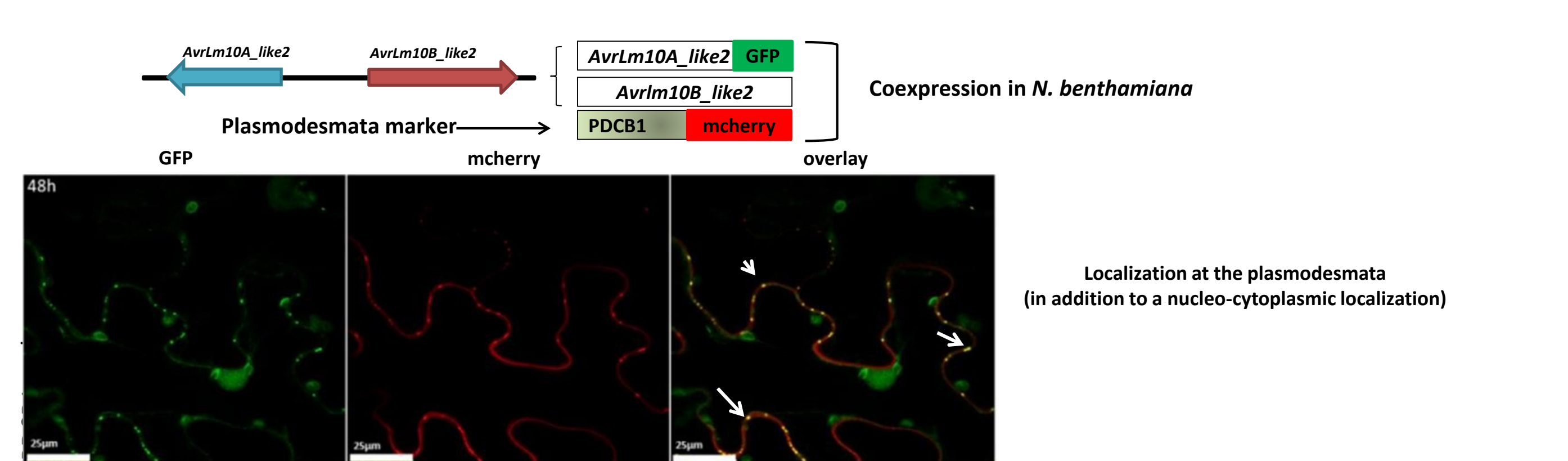
- Four pairs specifically expressed during the biotrophic stages of infection
- Two expression patterns
- Co-regulation of the two genes within a pair

3. Conservation of the AvrLm10A family in phytopathogenic fungi



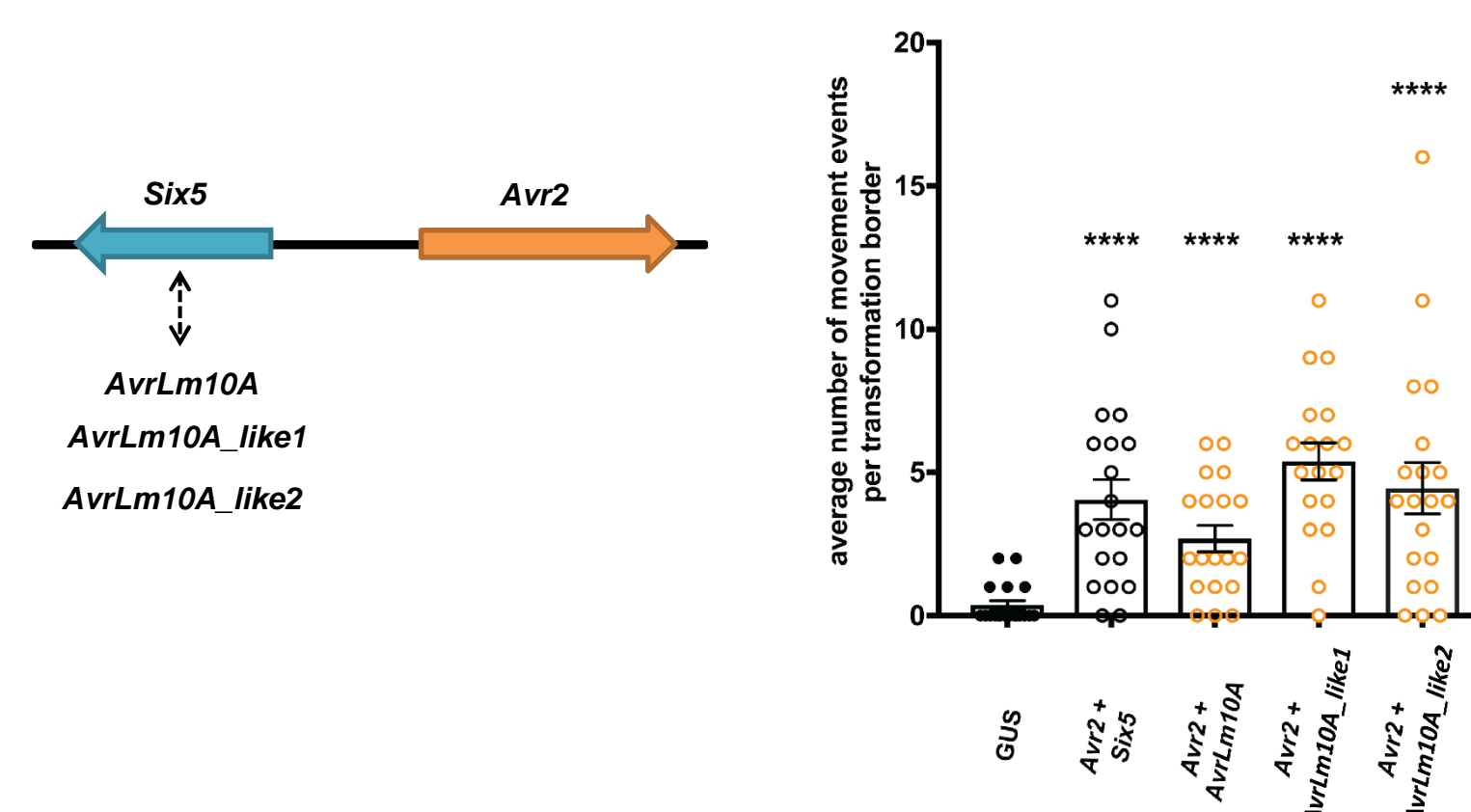
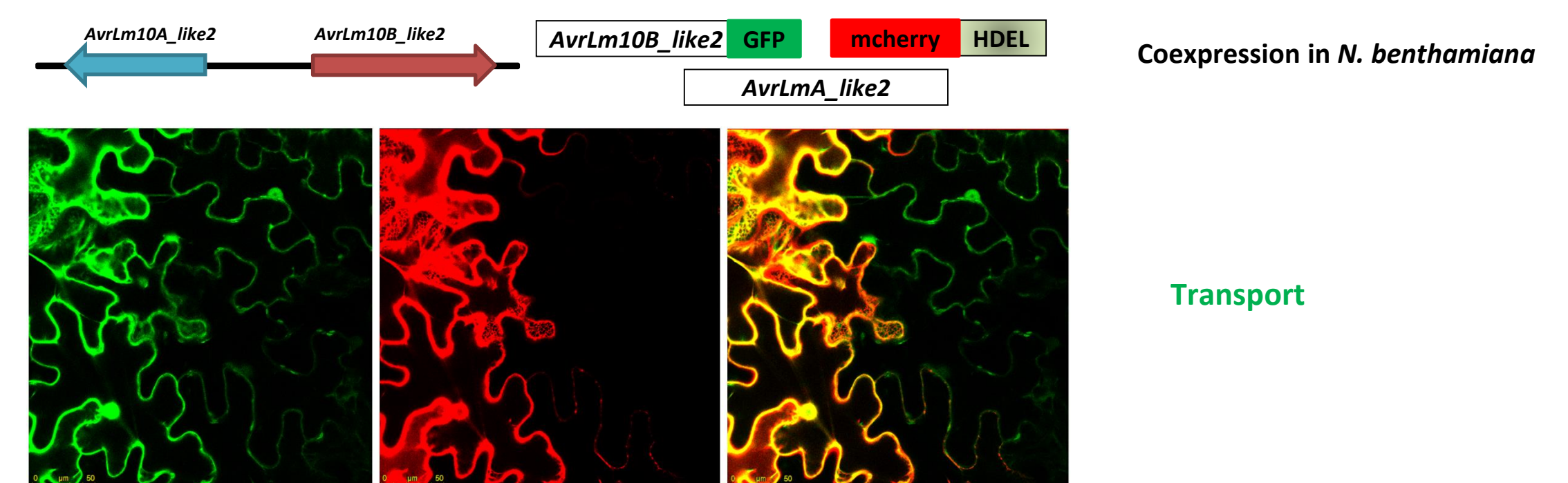
AvrLm10A homologues identified in 30 plant pathogenic fungi from the Dothideomycetes and the Sordariomycetes families. One of them, Six5 from *Fusarium oxysporum* f.sp. *lycopersici* (*Fo*) physically interacts with the avirulence effector Avr2 and is required for the movement of Avr2 from cell to cell through plasmodesmata (Ma et al., 2015; Cao et al., 2018). *AvrLm10A / Six5*: conserved cooperating effectors facilitating the transport of other effectors from cell to cell in plant pathogenic fungi?

5. Two AvrLm10A effectors localize at the plasmodesmata when expressed with their effector partner



AvrLm10A and AvrLm10A_like2 localize at plasmodesmata, in addition to a nucleo-cytoplasmic localization when expressed with their effector partner.

6. AvrLm10A(_like) effectors are able to transport their effector partner and Avr2 from cell-to-cell



AvrLm10A and AvrLm10A_like2 are able to transport their effector partner from cell to cell, and the three AvrLm10A(_like) effectors can replace Six5 in the transport of Avr2.

Conclusion

- We identified 71 AvrLm10A / Six5 homologs in plant pathogenic fungi (Sordariomycetes and Dothideomycetes)
- These AvrLm10A / Six5 homologs are associated with 8 different putative effector families
- At least in *F. oxysporum* and *L. maculans*, the role of cooperating AvrLm10A / Six5 effectors is to facilitate the transport of their effector partner (and Avr2) from cell-to-cell through plasmodesmata

Perspectives

- Is the effector transport mechanism through plasmodesmata conserved in other plant pathogenic fungi?
- What is the role of the transported effector? (suppression of PTI?)