TECHNISCHE UNIVERSITÄT DRESDEN

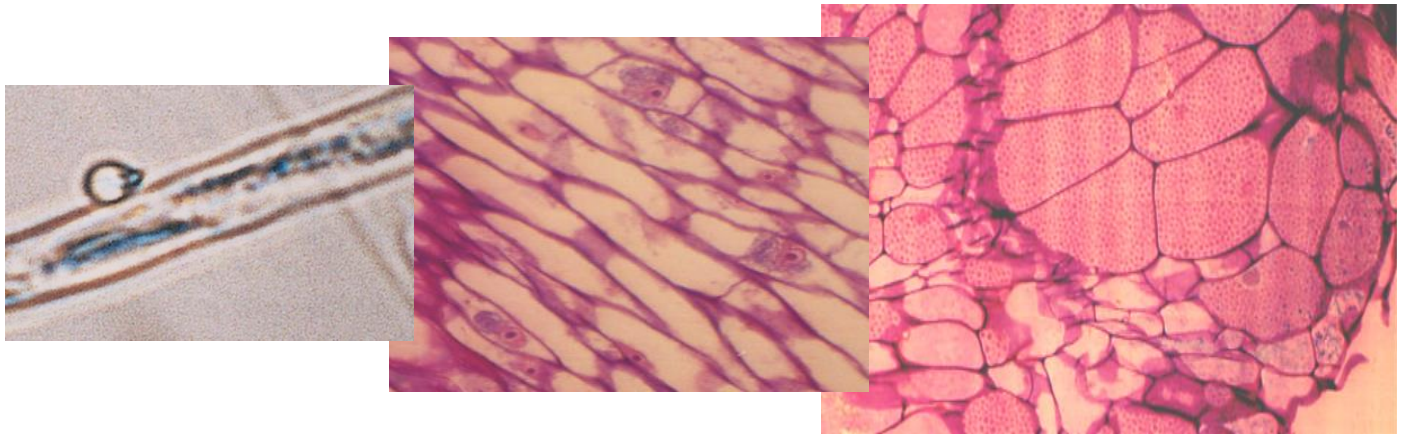
Jutta Ludwig-Müller

Department of Biology Institute of Botany Chair Plant Physiology

Hormone signaling during the development of the clubroot disease in *Arabidopsis thaliana* roots

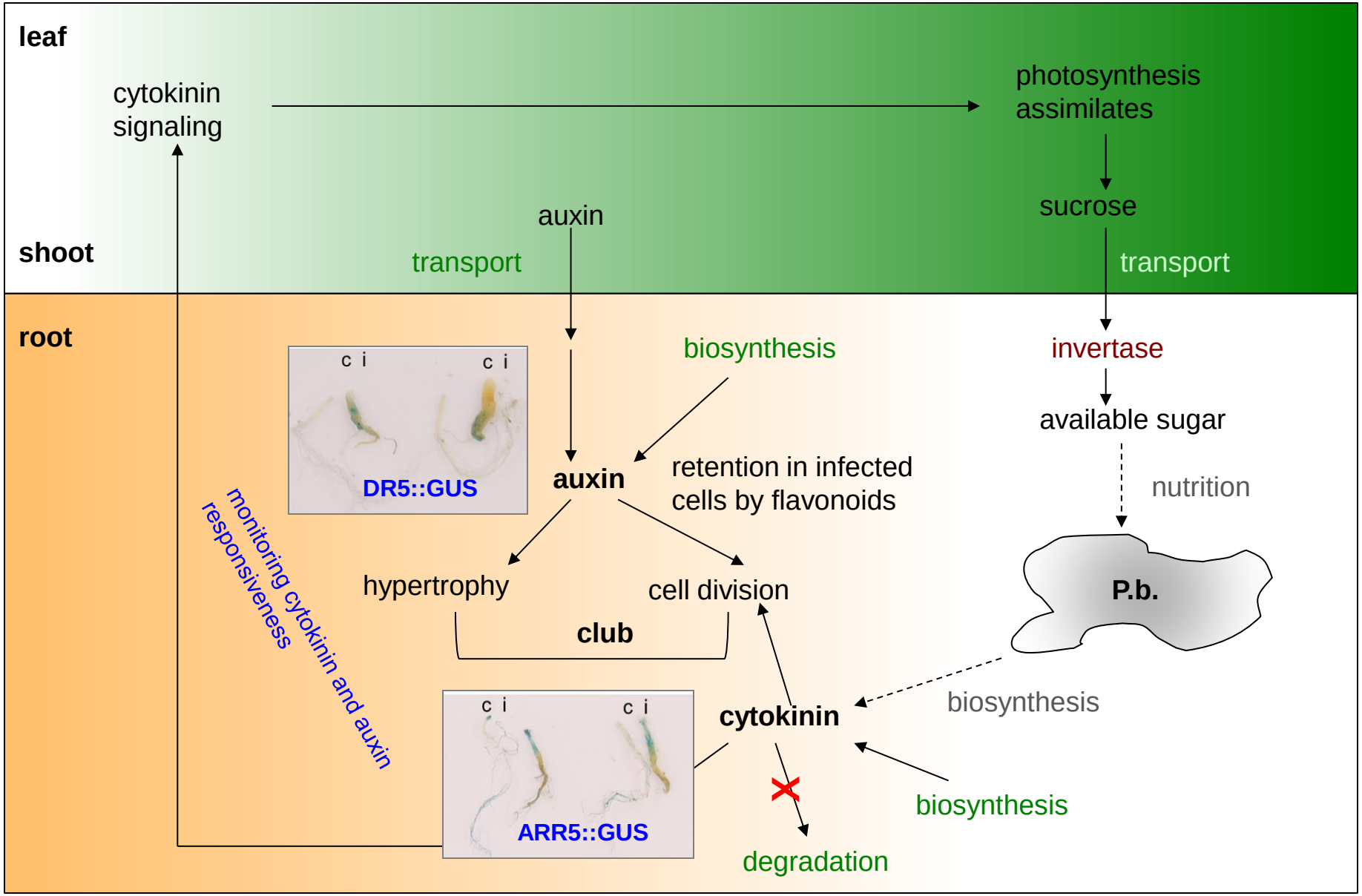
Arabidopsis thaliana as a model system for clubroot research

Arabidopsis roots in different disease classes



disease progression

Plant hormones are associated with club development



Auxin signaling and target gene regulation

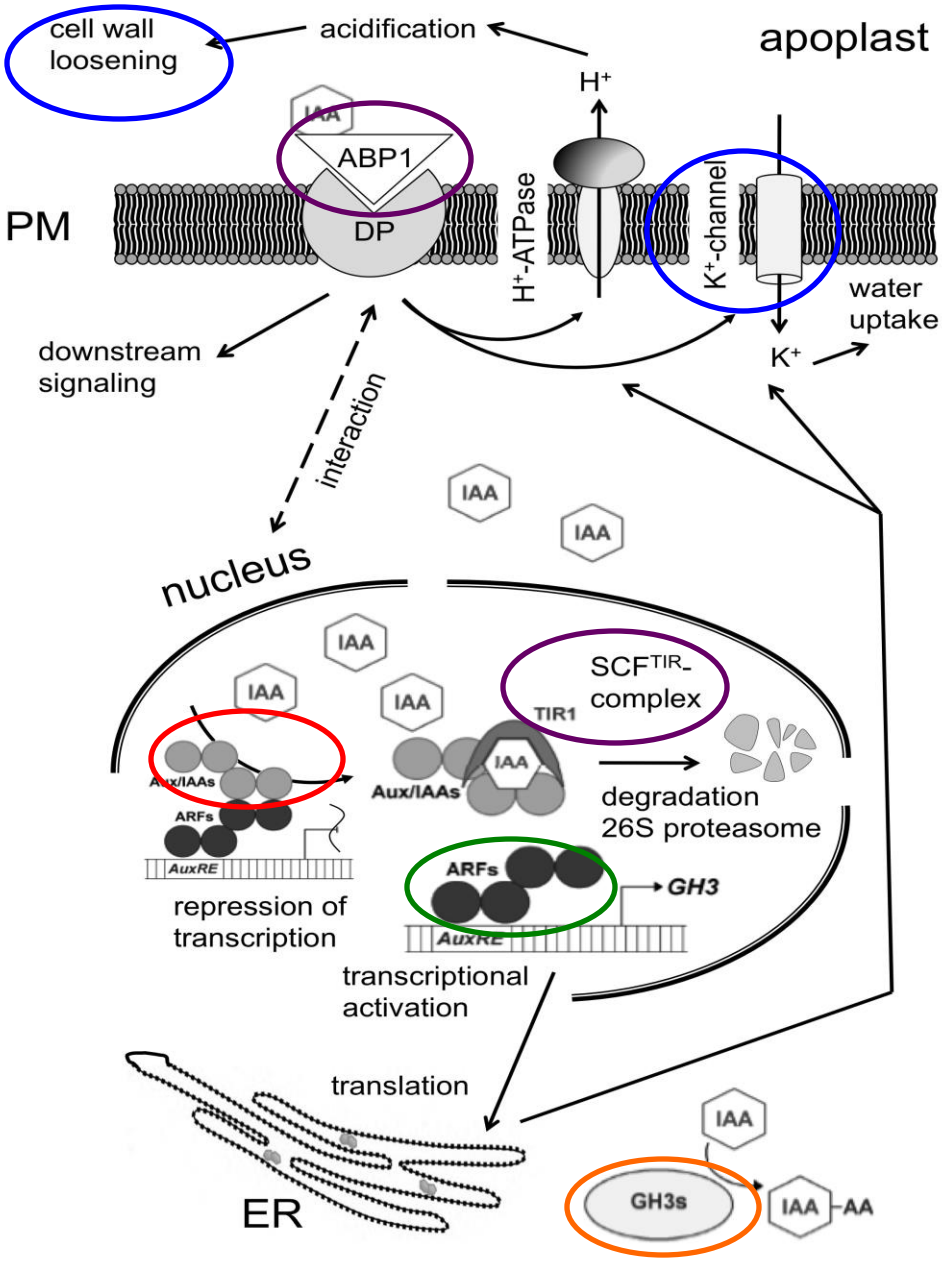
target genes

auxin receptors

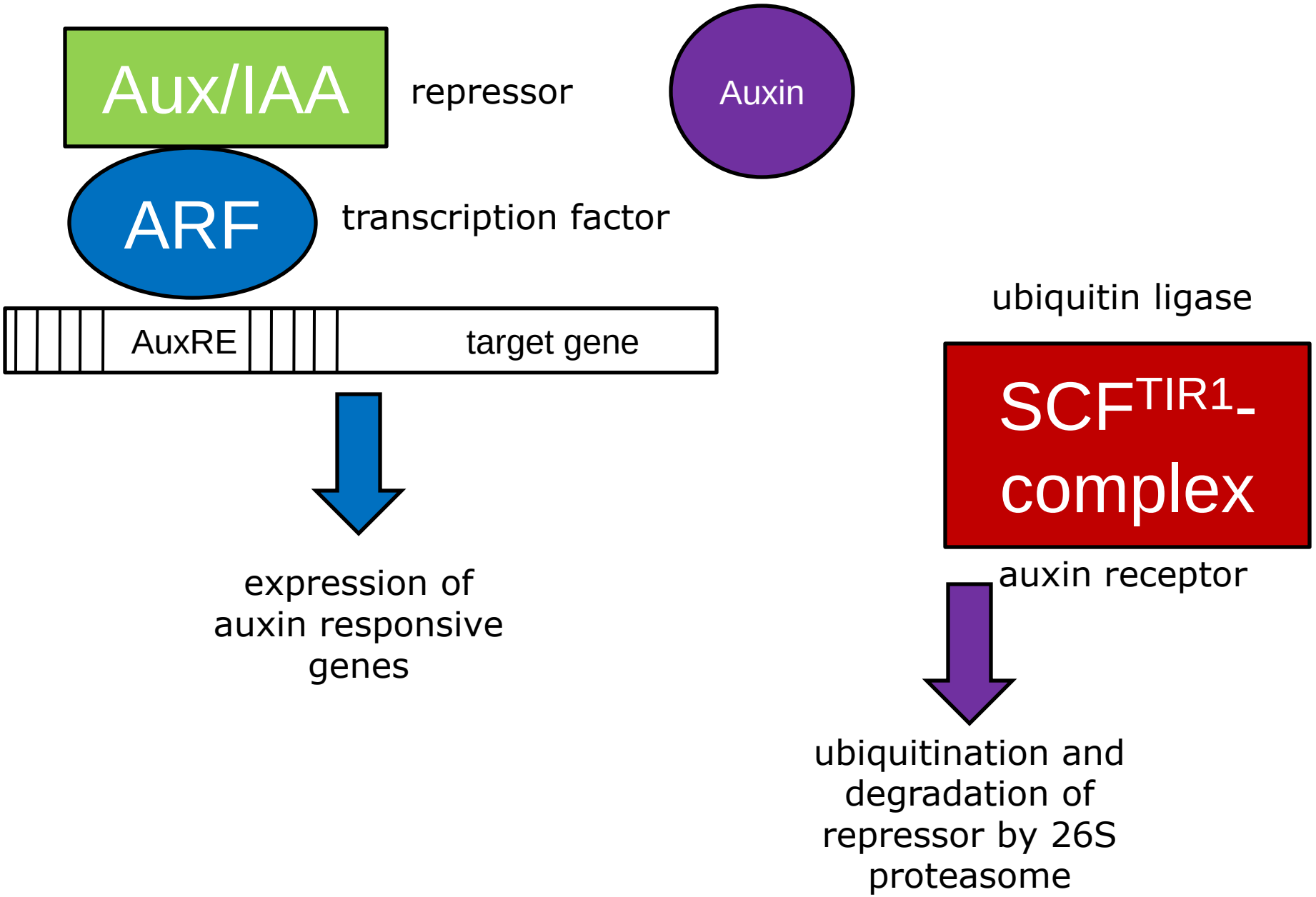
transcriptional repressors

transcriptional activators

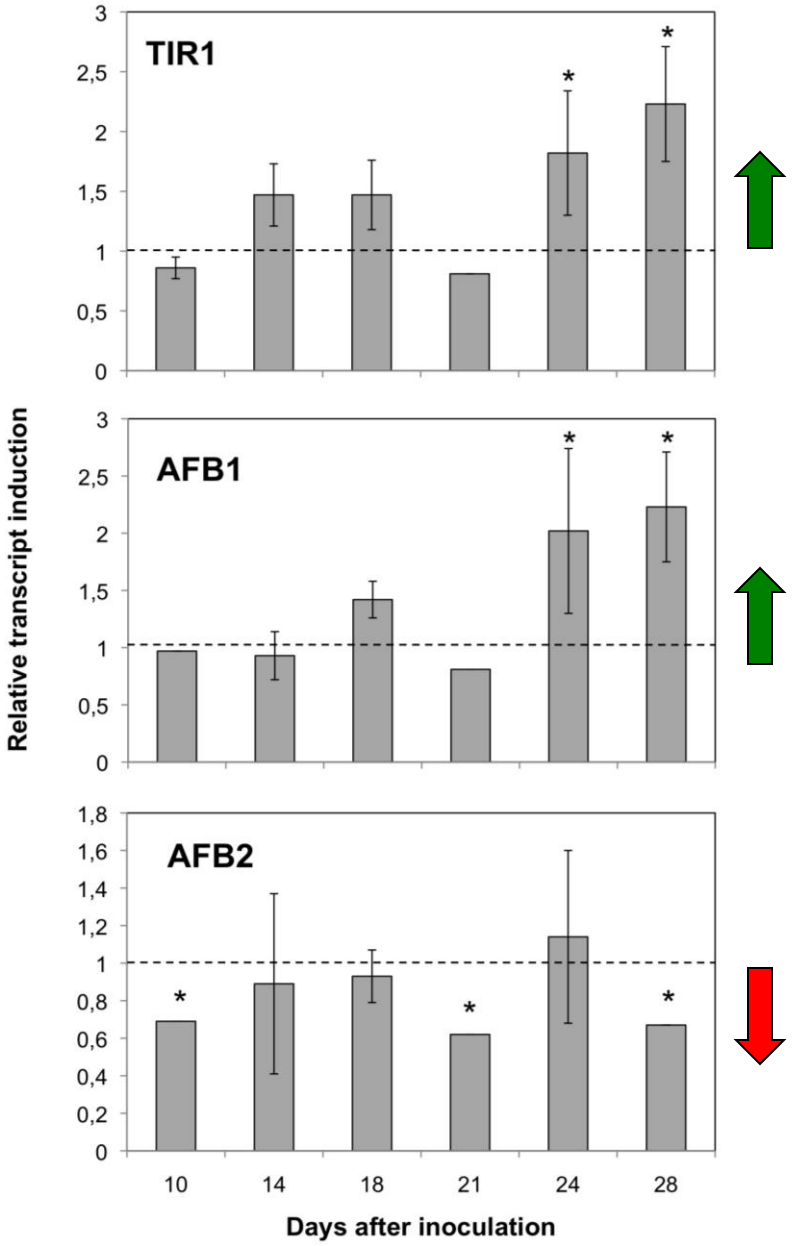
auxin homeostasis

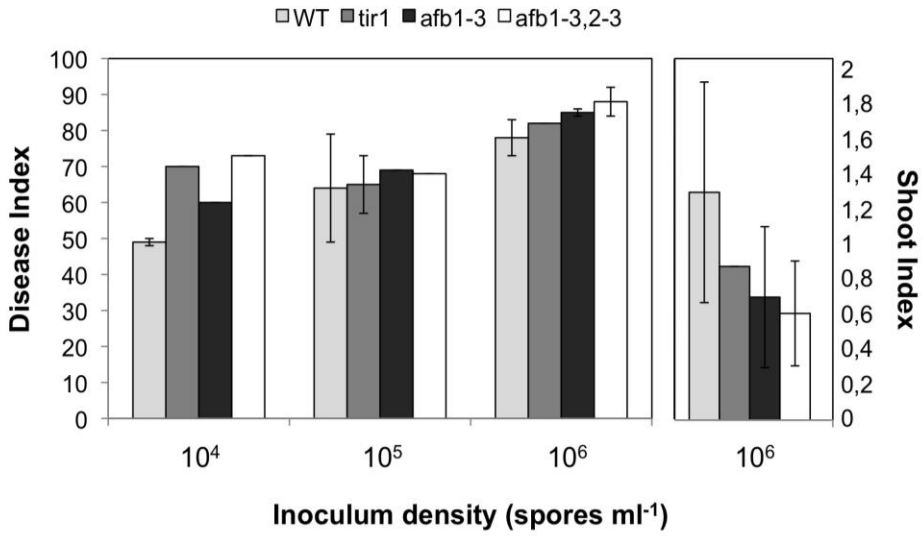


The SCF^{TIR} pathway for auxin signaling



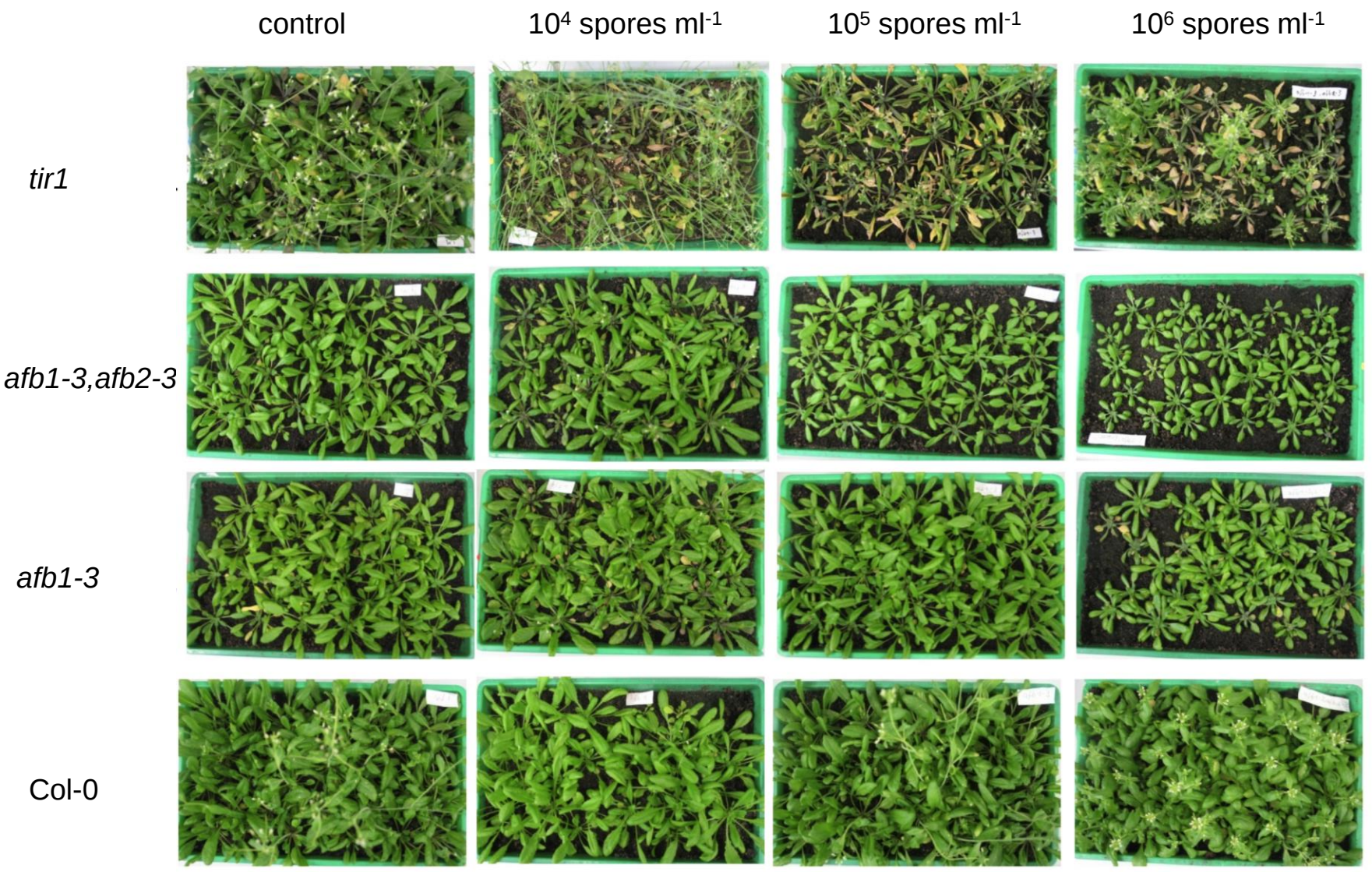
Expression of the TIR1 family in clubroots





Sabine Bergmann

TIR receptor mutants are more susceptible



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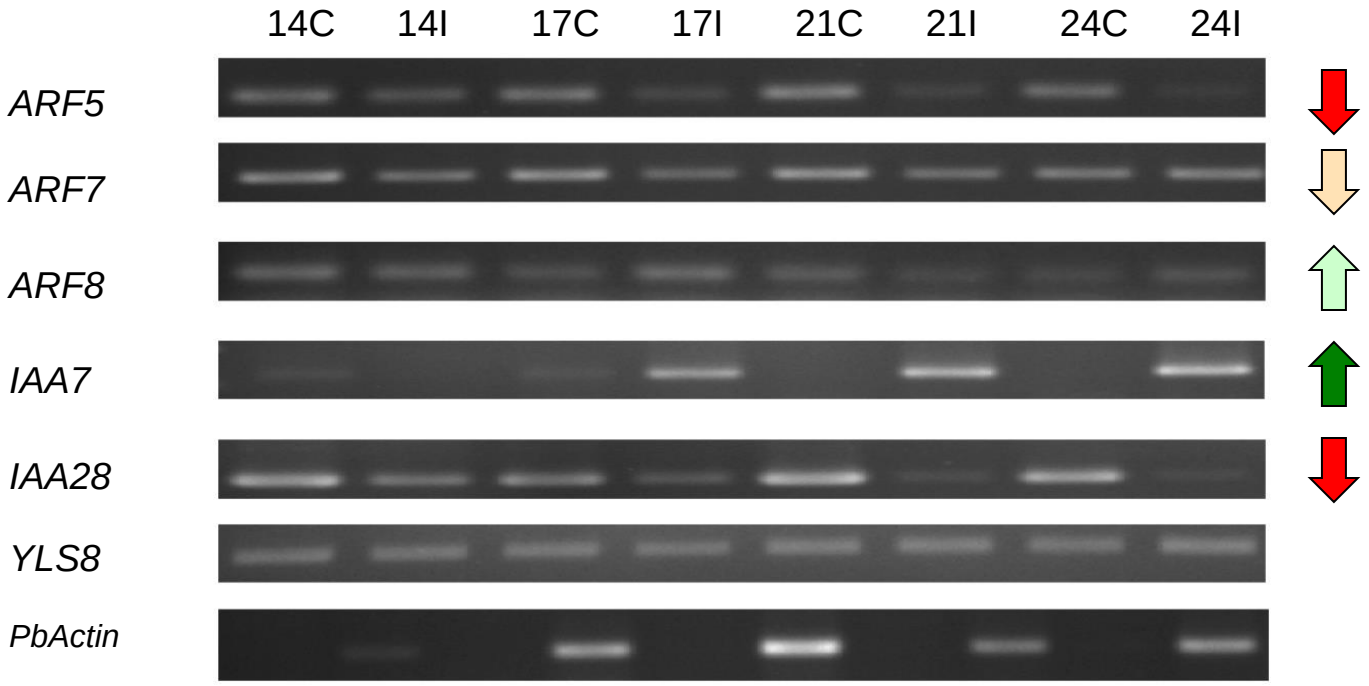
Expression analysis of transcriptional repressors and activators in clubroots



- genes were chosen according to microarray data Siemens et al. (2006)
- ARF5 → monopteros (MP) Hardtke et al. (2004) Development
- ARF7 positive regulator of lateral root formation Okushima et al. (2007) Plant Cell
- ARF8 → positive regulator of GH3.5 ! Gutierrez et al. (2012) Plant Cell

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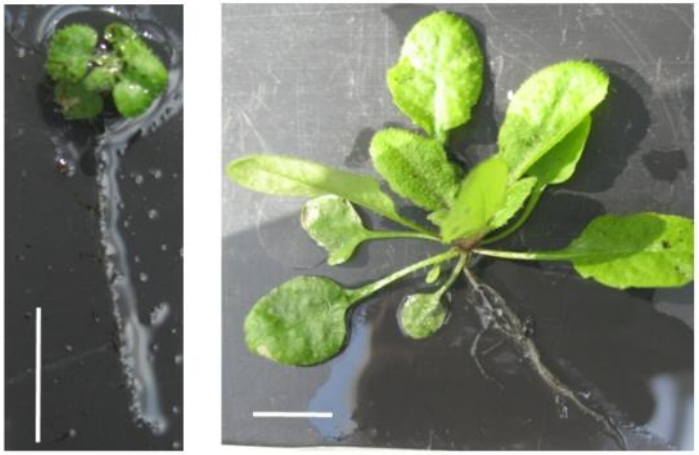
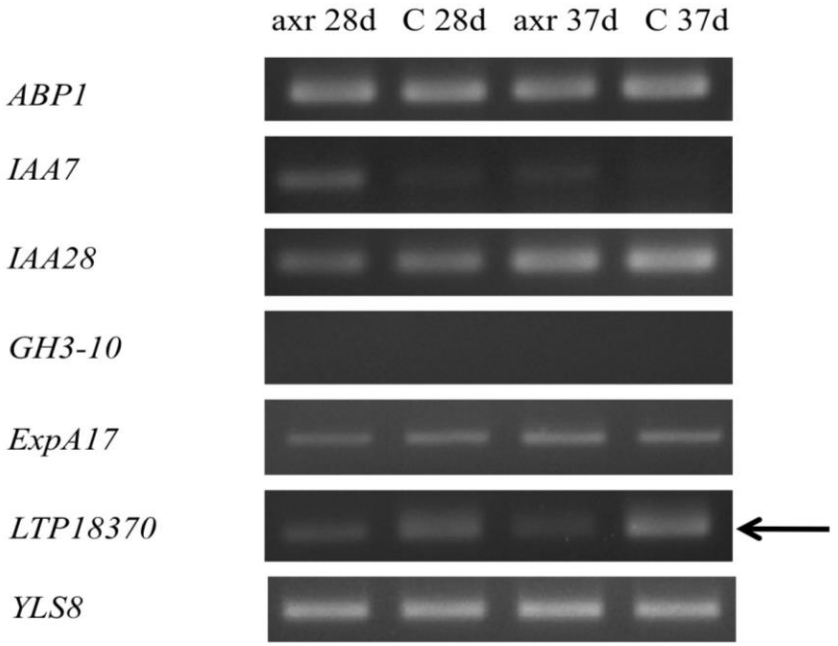
The constitutive repressor mutant *axr2-1* (*iaa7*) can help to find other target genes of the pathway



comparison microarray with *iaa7* and microarray with *P. brassicae*

Microarray data Nakamura et al. (2006)
Siemens et al. (2006)



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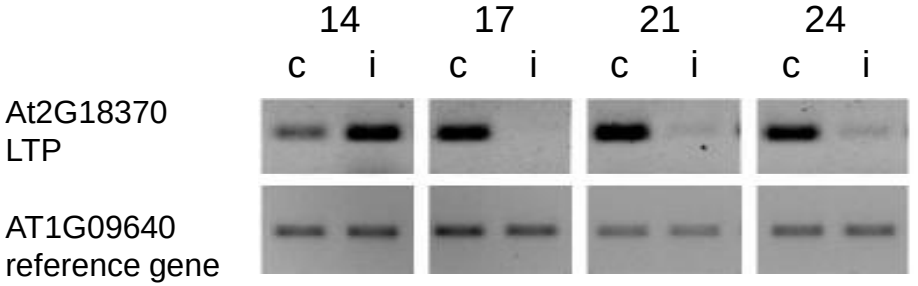
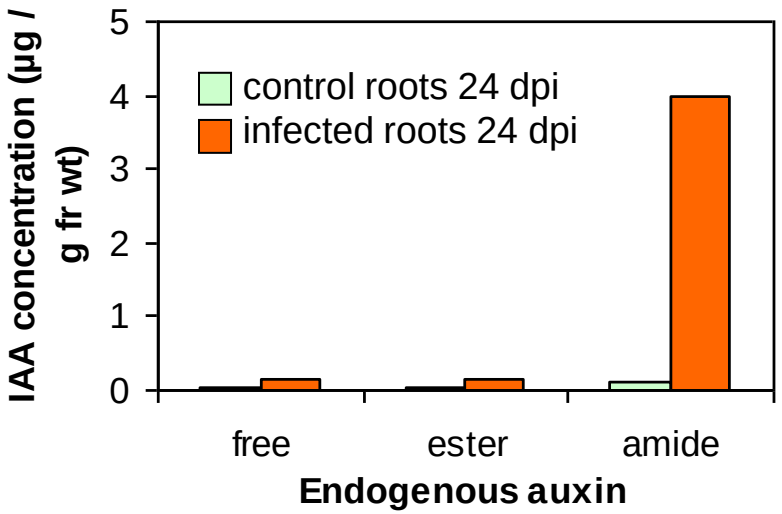
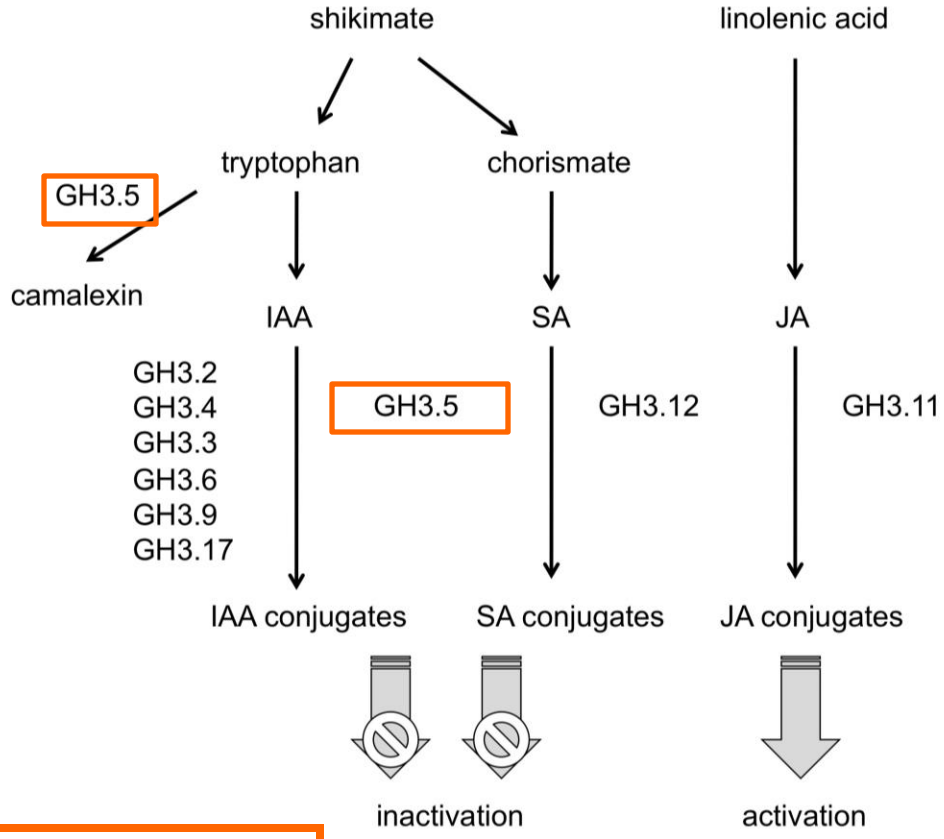


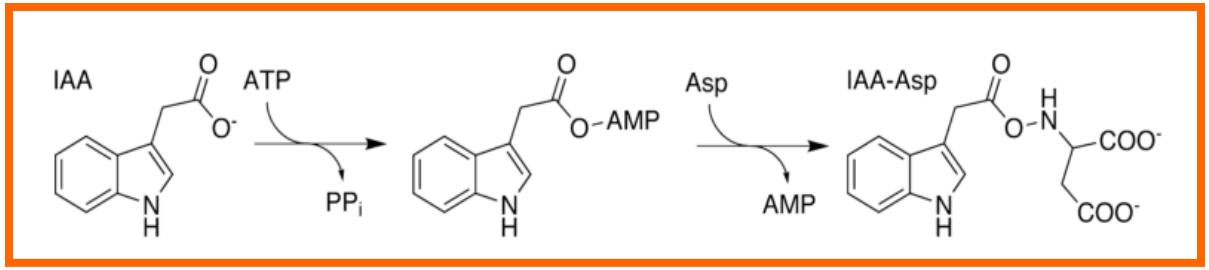
Sabine Jülke

Auxin conjugation is upregulated

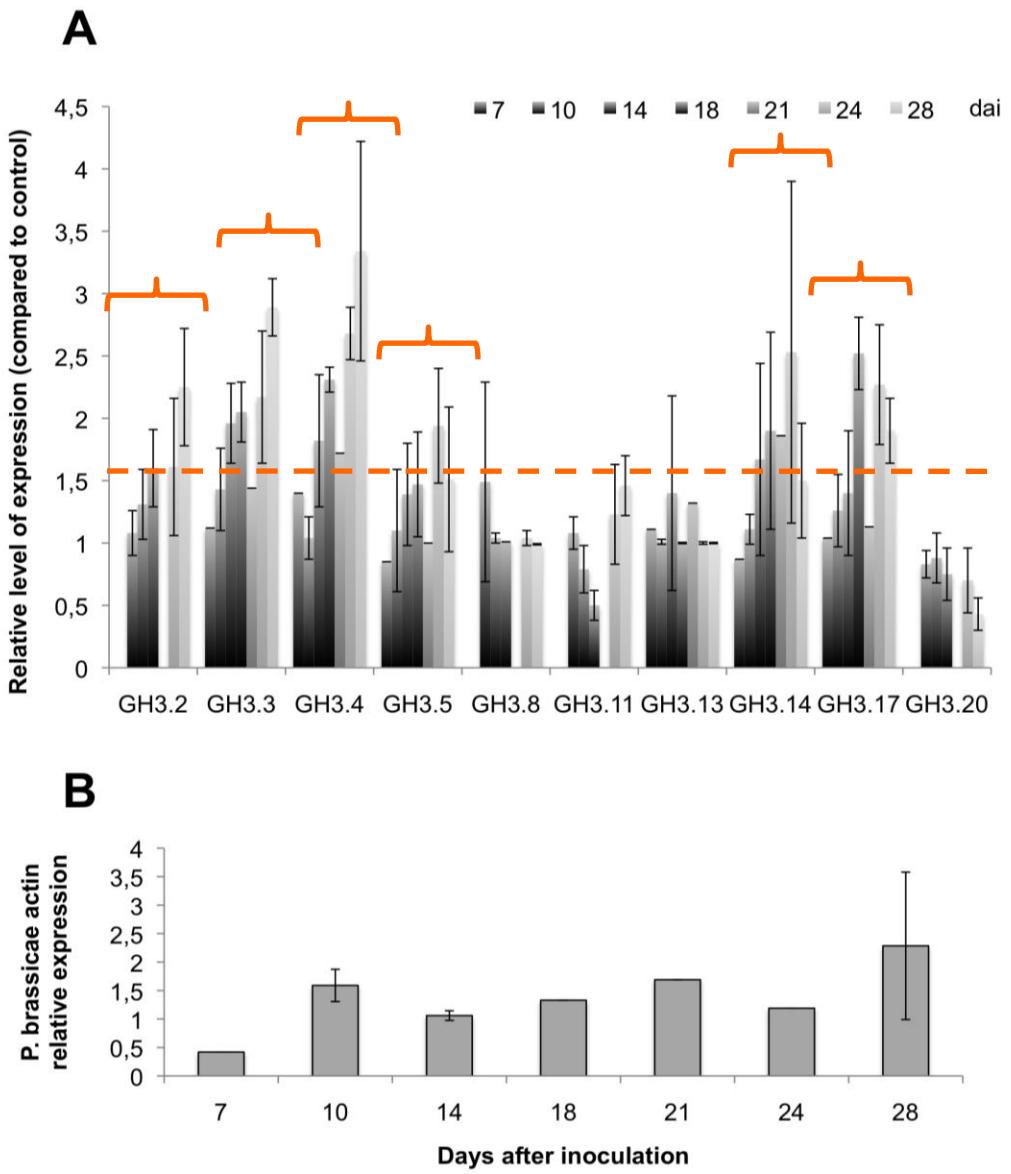


Ludwig-Müller et al. (1996) Physiol. Plant.





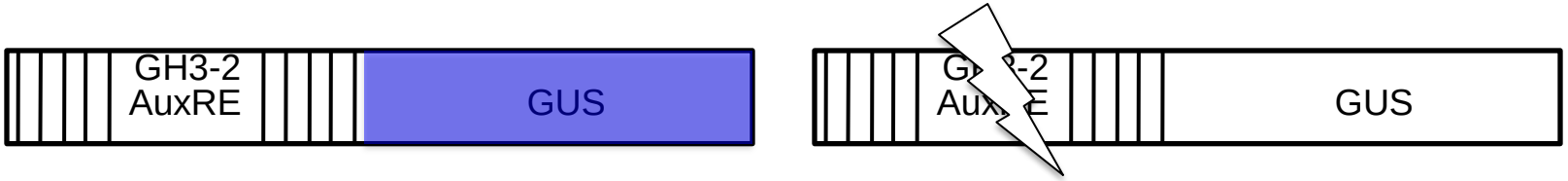
Differential regulation of selected *AtGH3* genes



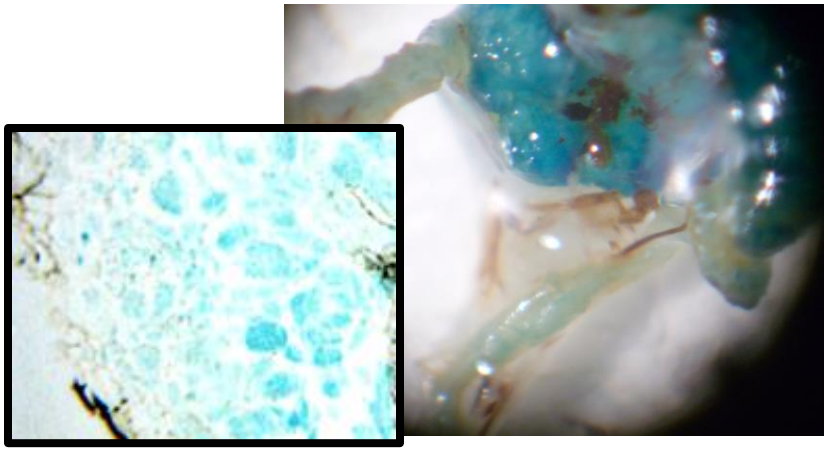
Winter et al., bar.utoronto.ca

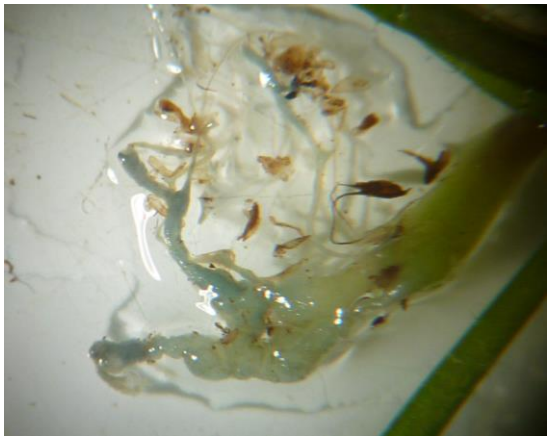
Cornelia Horn
Linda Jahn
Stefanie Mucha

The auxin response element in the GH3 promoter is necessary for upregulation in clubroots



GUS lines obtained from Claus Schwechheimer (TU München)



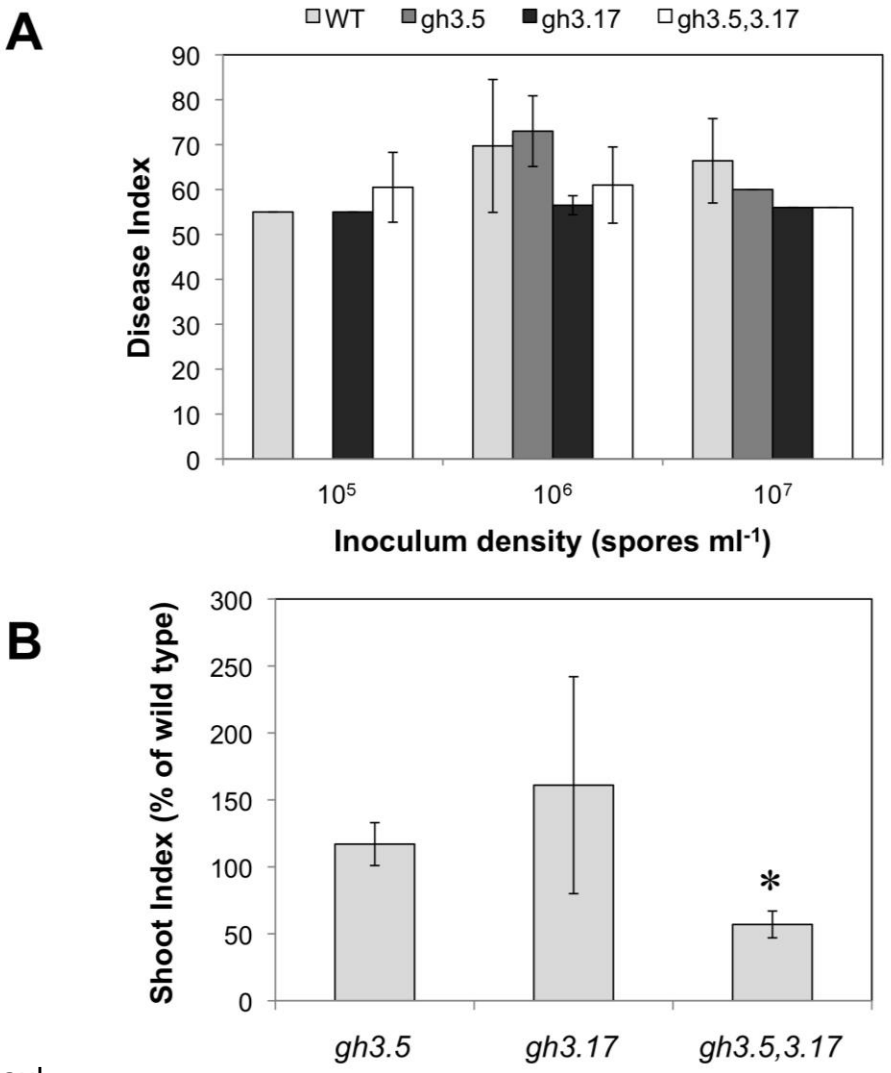


pGH3-2::GUS

mpGH3-2::GUS

Stefanie Mucha

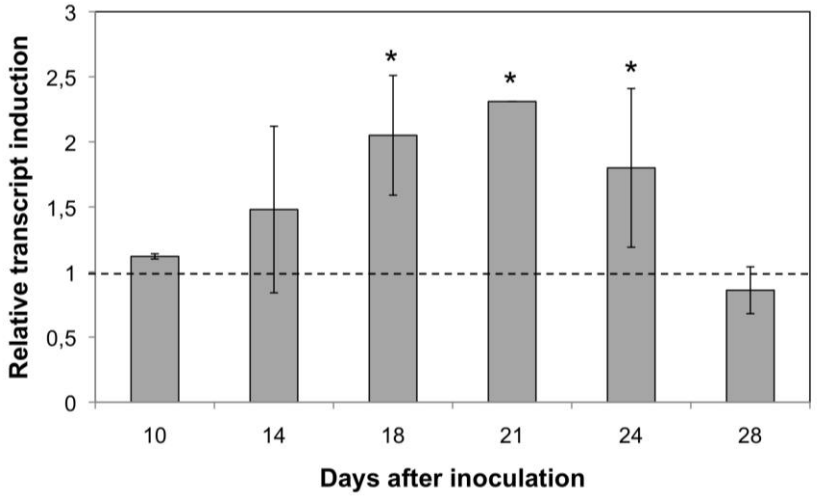
GH3 double knockouts are slightly more susceptible than wild type



double mutants obtained from Paul Staswick, University of Nebraska

Linda Jahn

Auxin binding protein 1 expression is upregulated in clubroots

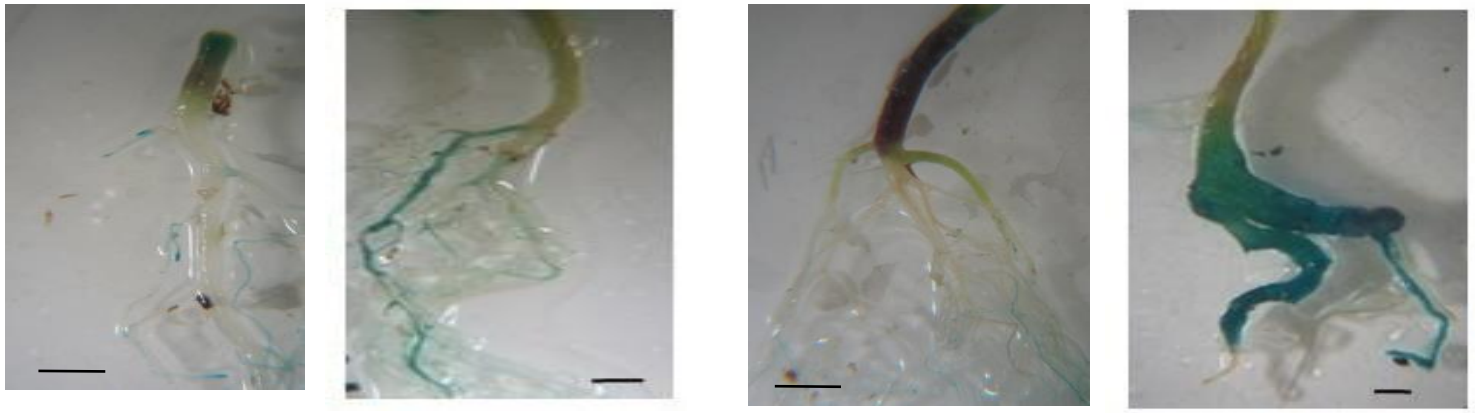


14 dai

c i

21 dai

c i

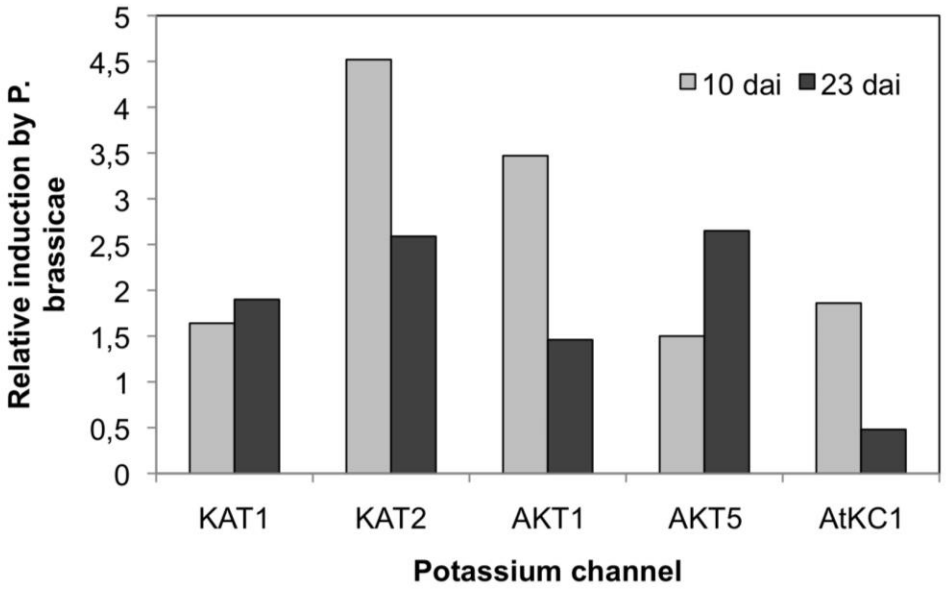


pABP1::GUS

collaboration Bianka Steffens (University Kiel)

Sabine Bergmann

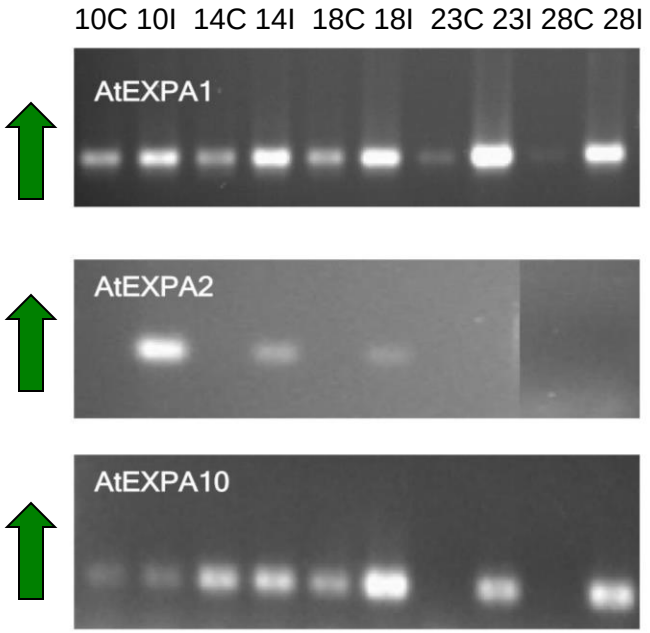
Potassium channels are upregulated by clubroot

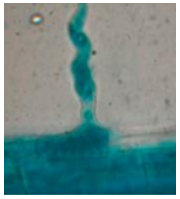


- data from microarray analysis Siemens et al. (2006)
- channels depicted here are expressed in the Arabidopsis hypocotyl Fuchs et al. (2006)
- all belong to cyclic nucleotide binding / inward rectifier potassium channels

Expansins: Target genes for auxin action?

Several Expansins are upregulated by auxins and during clubroot

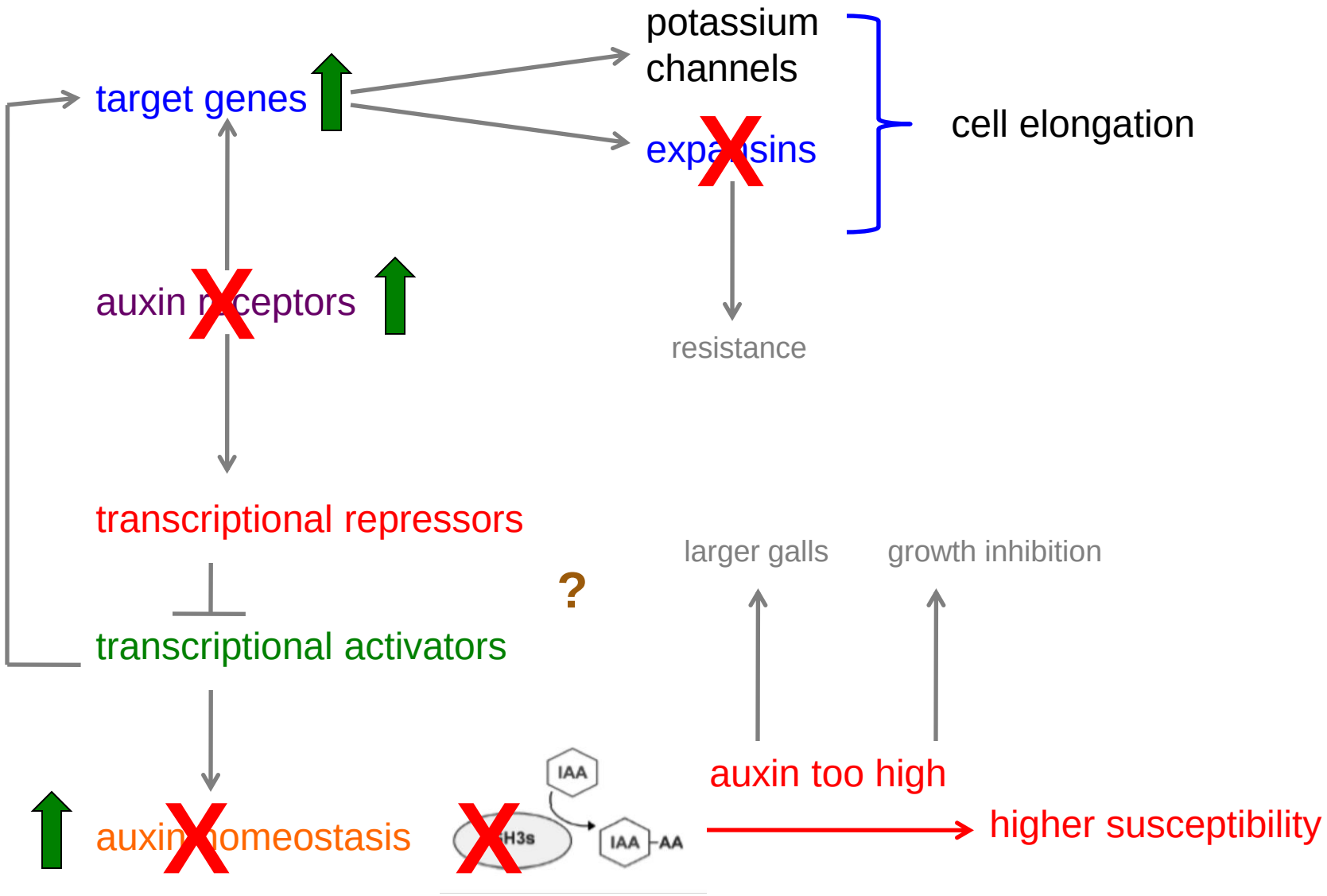




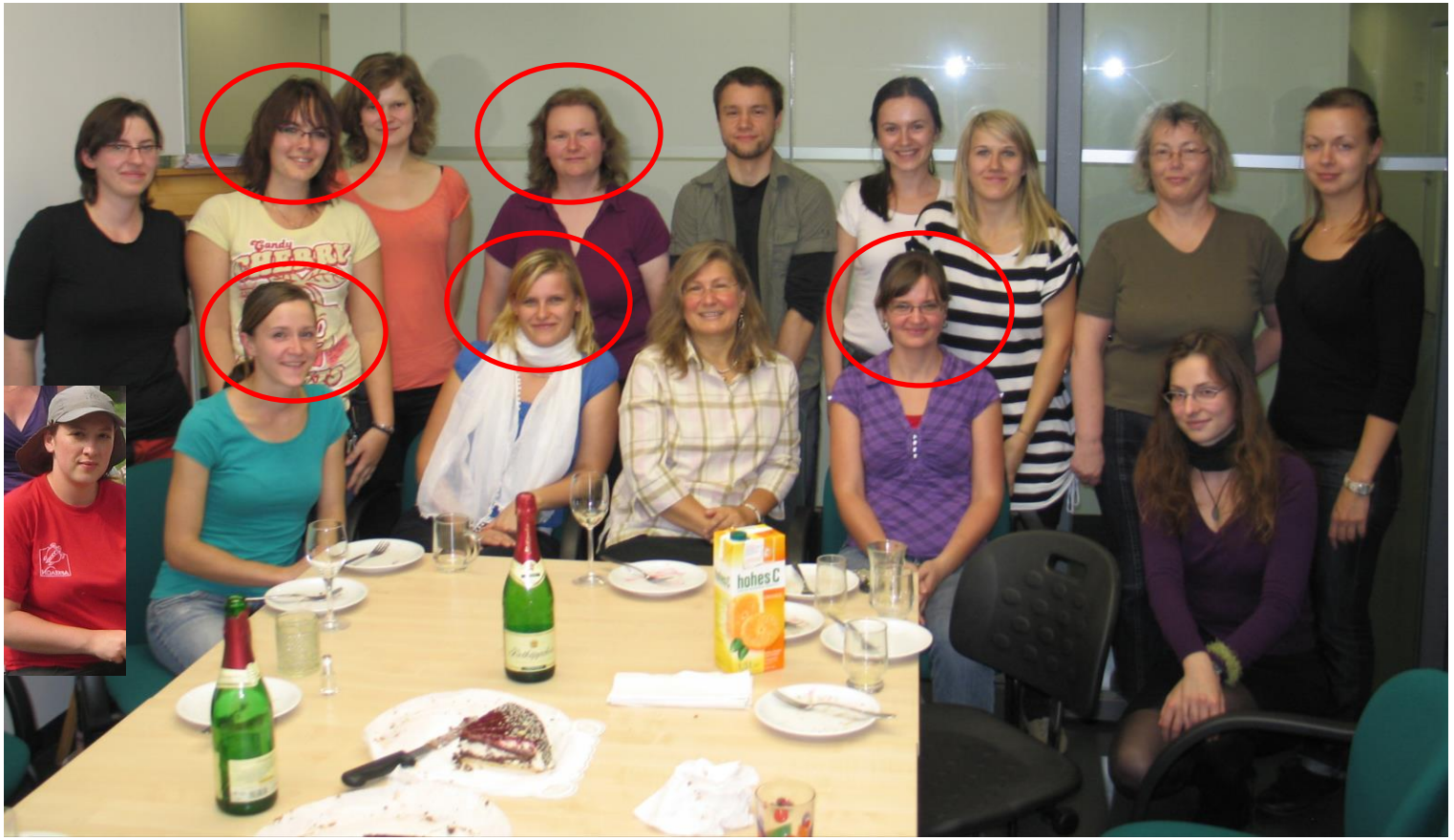
collaboration Florian Grundler (University Bonn)

Sabine Marschollek

Auxin signaling and target gene regulation



Thanks to:



Funding:

German Science Foundation

State of Saxony