Way of Transport


cellulose synthase

plasma membrane

cellulose microfibril

Apoplastic: Ions, Auxin, Peptides

Symplastic Connection: Plasmodesmata

Plasmodesmata
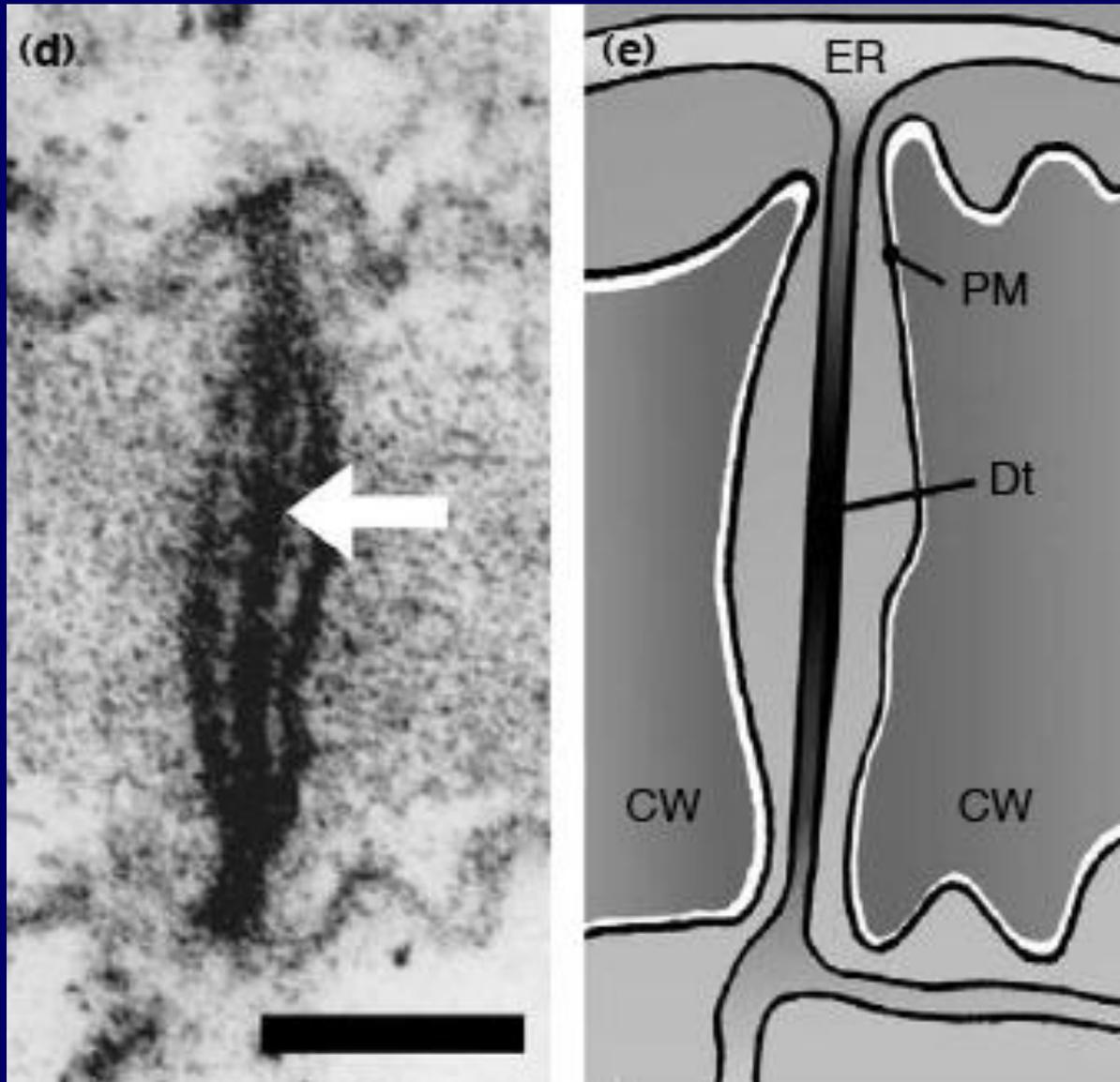
Transport to/through Plasmodesmata

Basal and dynamic

Size Exclusion Limit

Cell wall

Plasmodesma

Nucleus
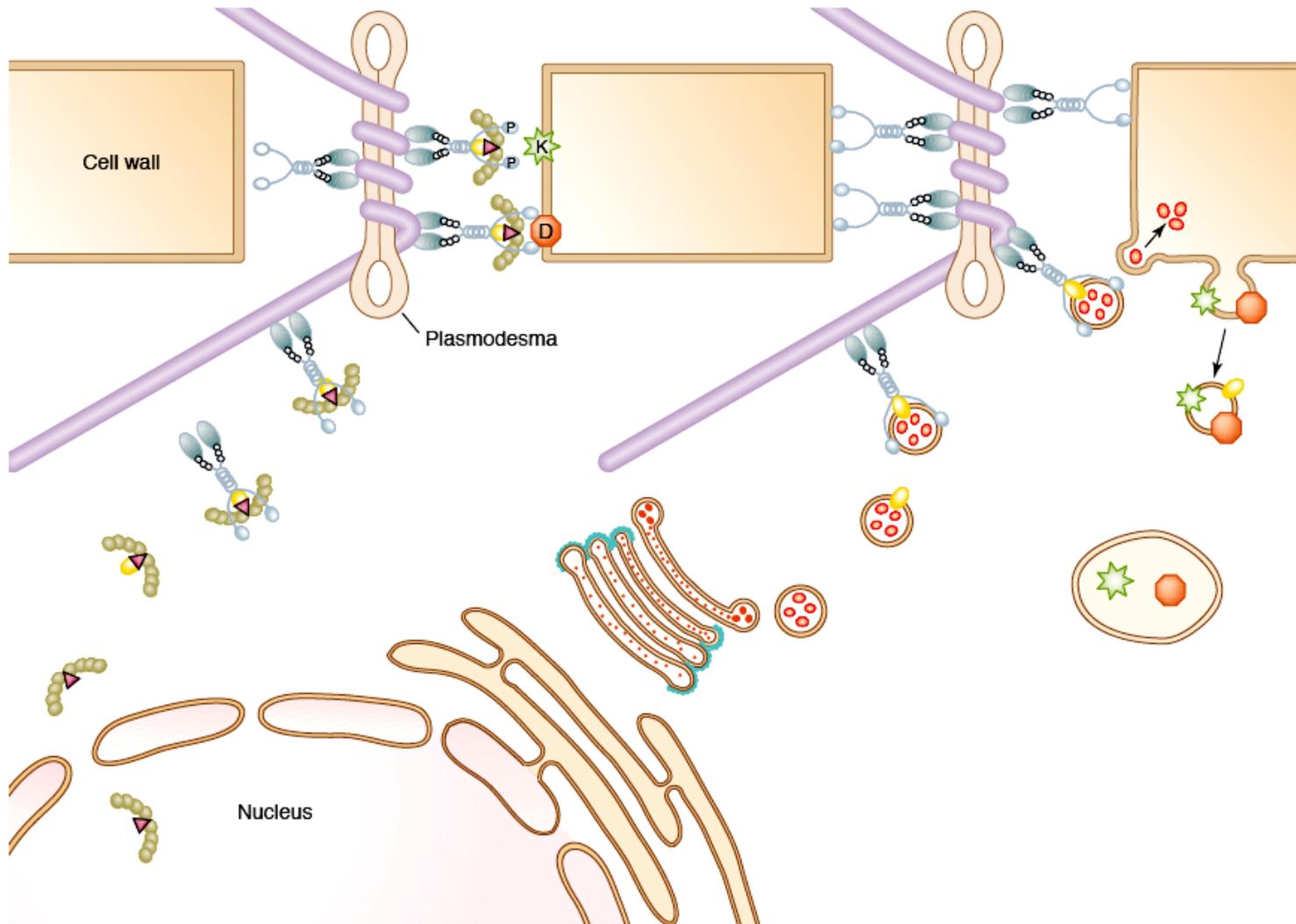
Ribonucleoprotein complex	Cytoplasmic chaperone (putative Rab)	PD-docking protein
Nuclear export factor	Myosin	PD-kinase
	Actin	Golgi-derived cargo
		Endosomal compartment
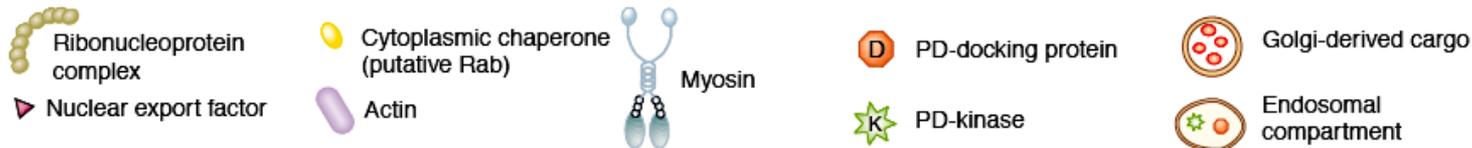
Development of Plasmodesmata

simple   complex

Pickard & Beachy (2005) Cell 98, 5-8
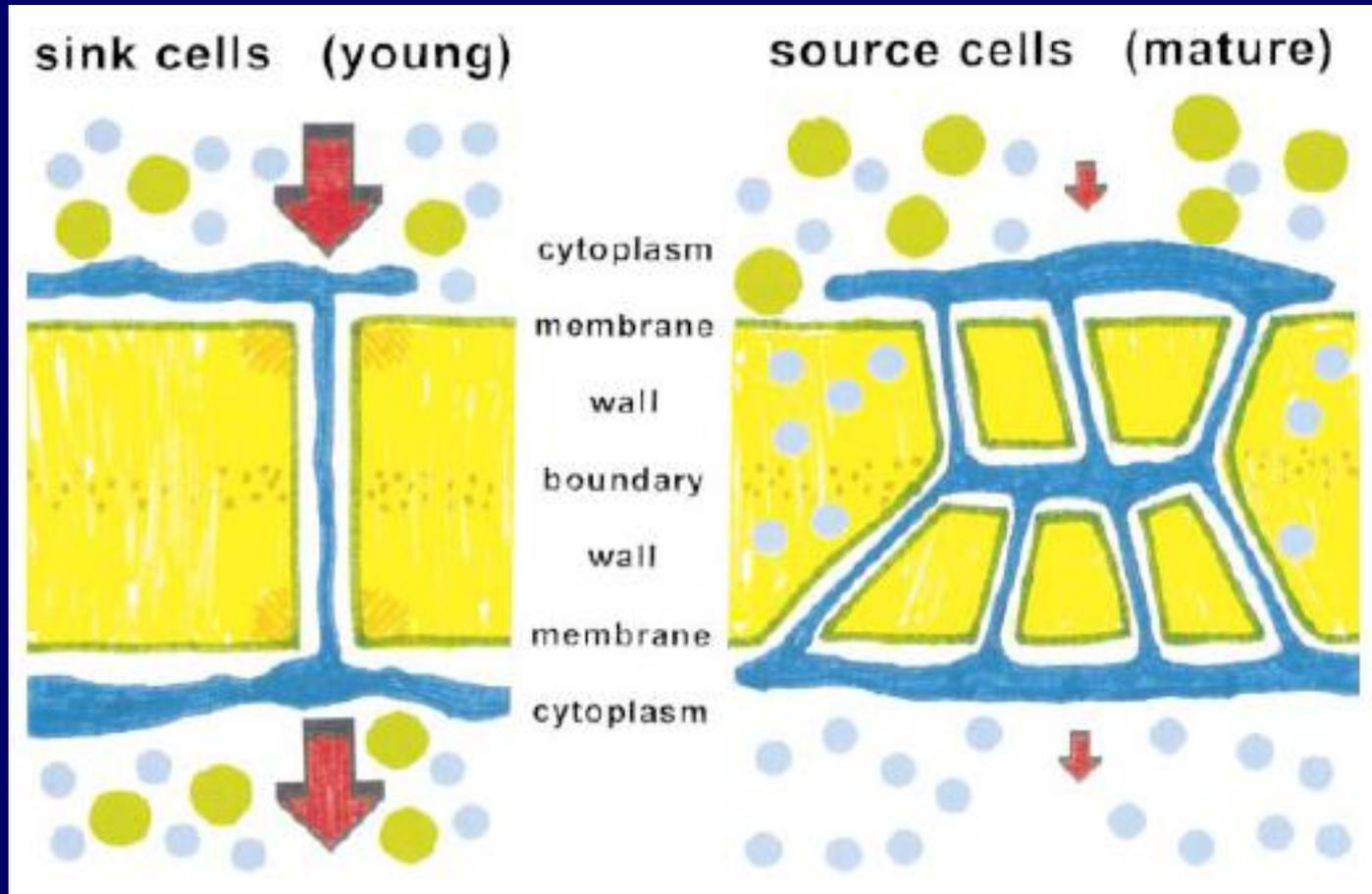
# PD-localisated Proteins

AtRGP2-GFP
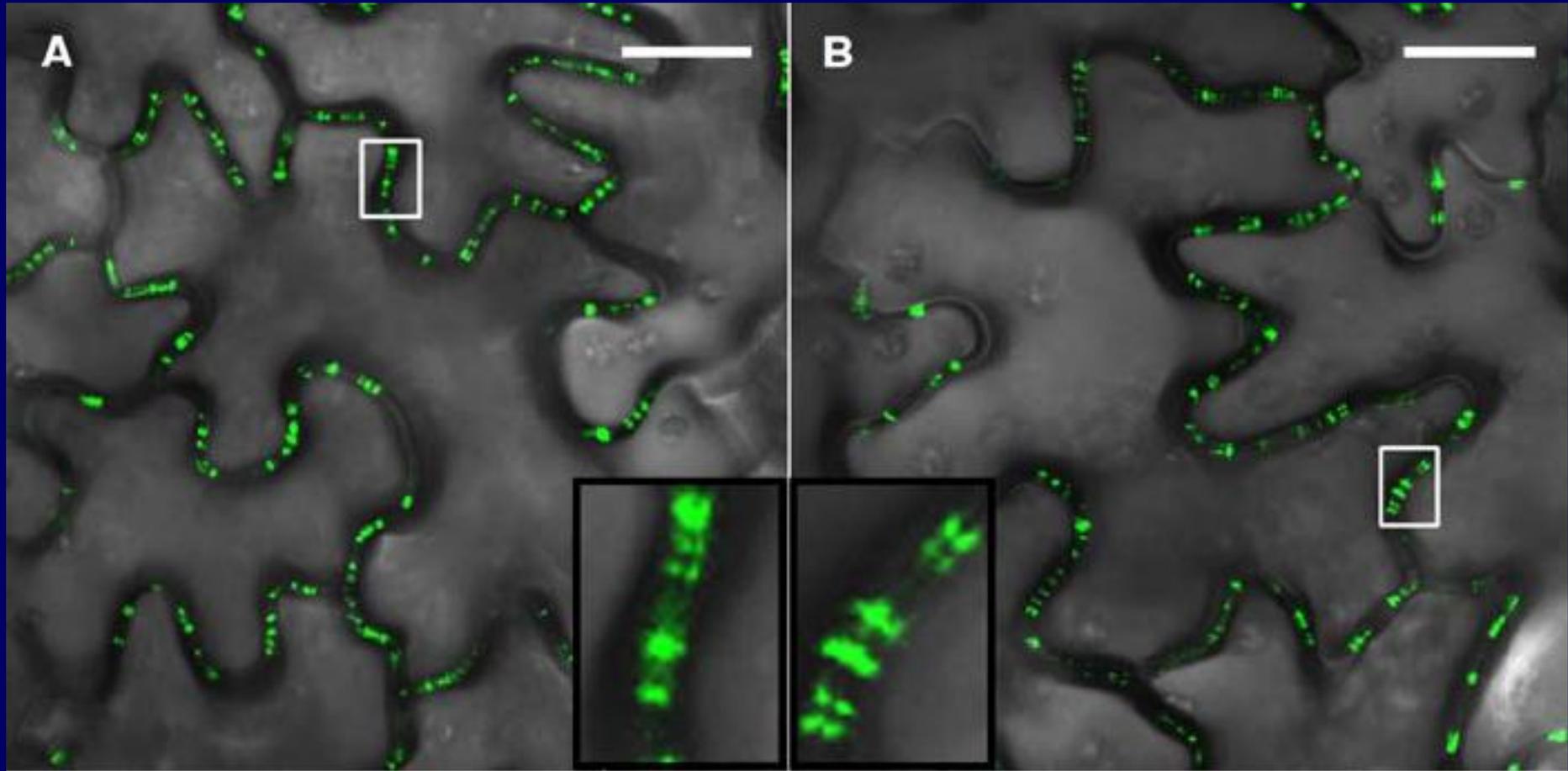
RGP = reversibly glycosylated protein

Size exclusion limit - GFP Transport in Embryos

STM::GFP   STM ::(GFP)2   STM::(GFP)3   MSG2::(GFP)2

co

co

hy

ro
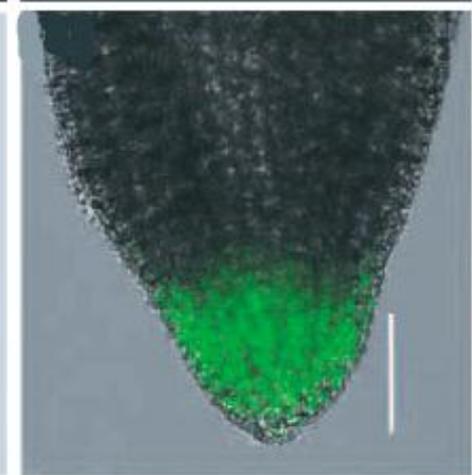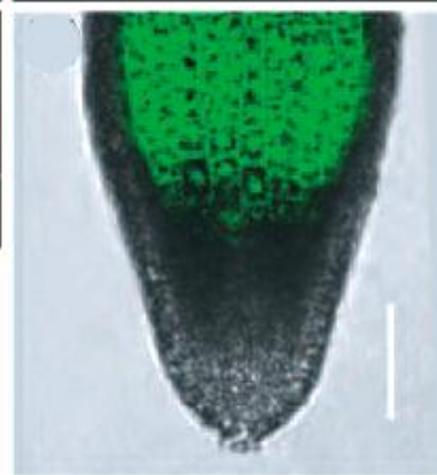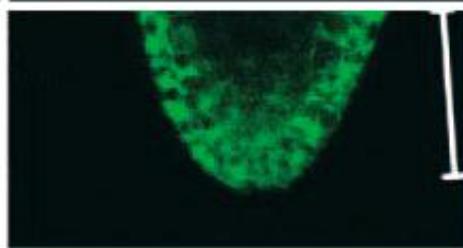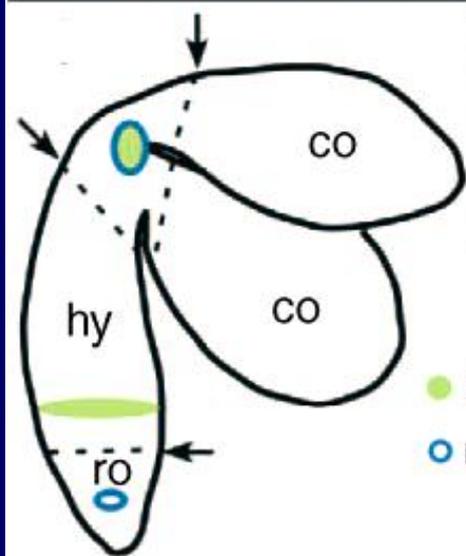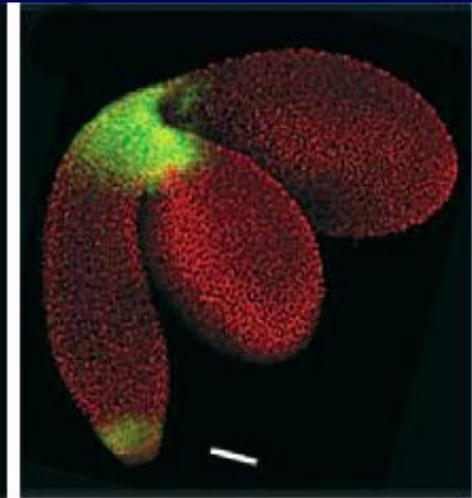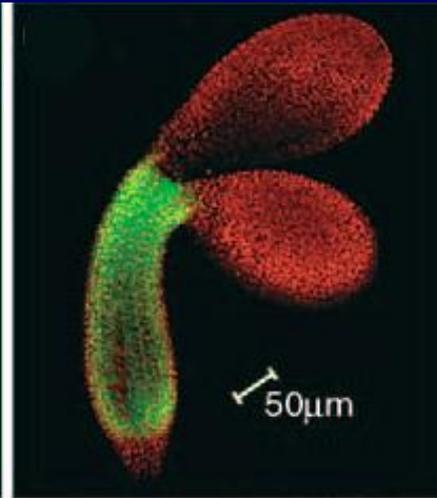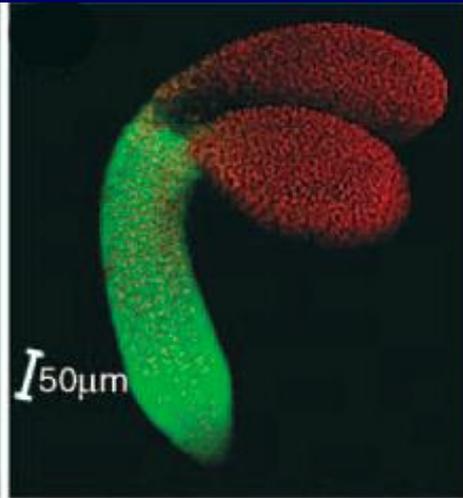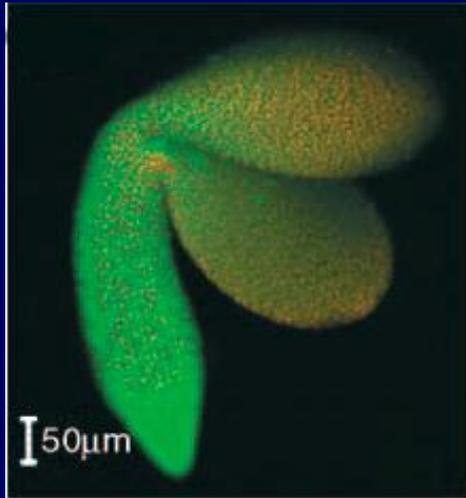
- STM promoter active site
- mRNA in MSG2

Dynamic size exclusion limit in root epidermis cells
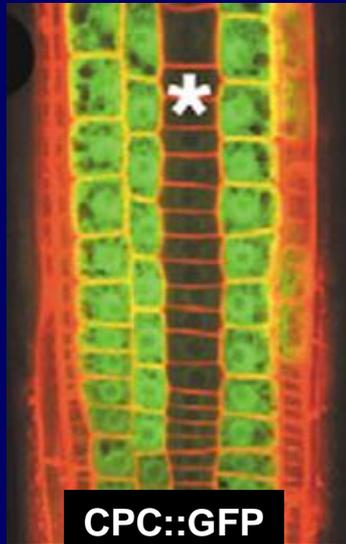
CPC::GFP
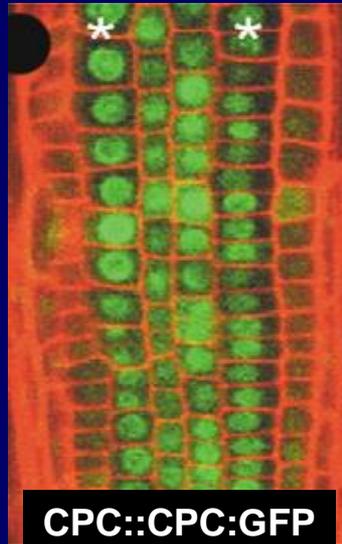
CPC::CPC:GFP

CPC::CPC:(GFP)3

CPC::CPC:(GFP)4

Kurata et al. (2005) Development 132, 5387-5398
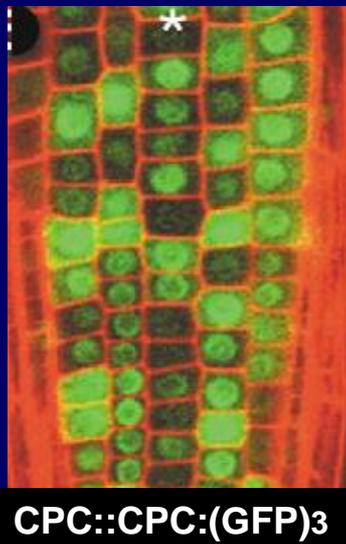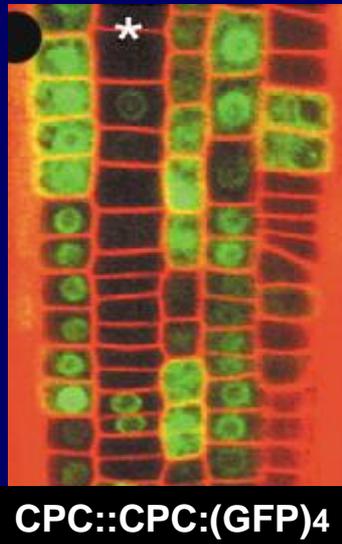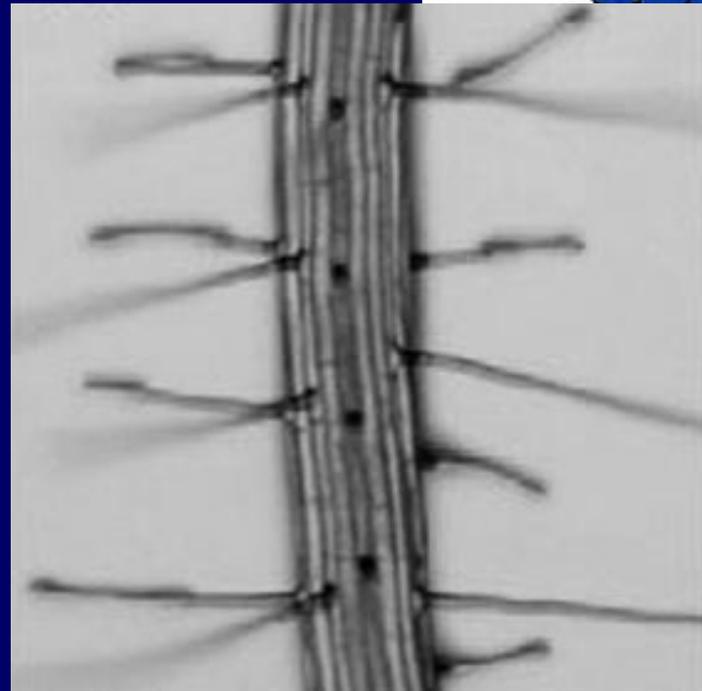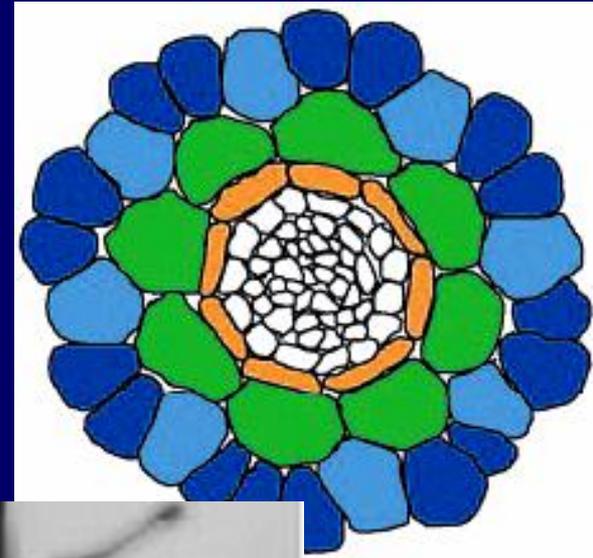
Identification of Plasmodesmata-based Signals

Idea

wild type   gl1 mutant   gl1 mutant +pRbcS-GL1   gl1 mutant +pRbcS-GL1~KN1

Ep
Me

● GL1   ●● GL1~KN1
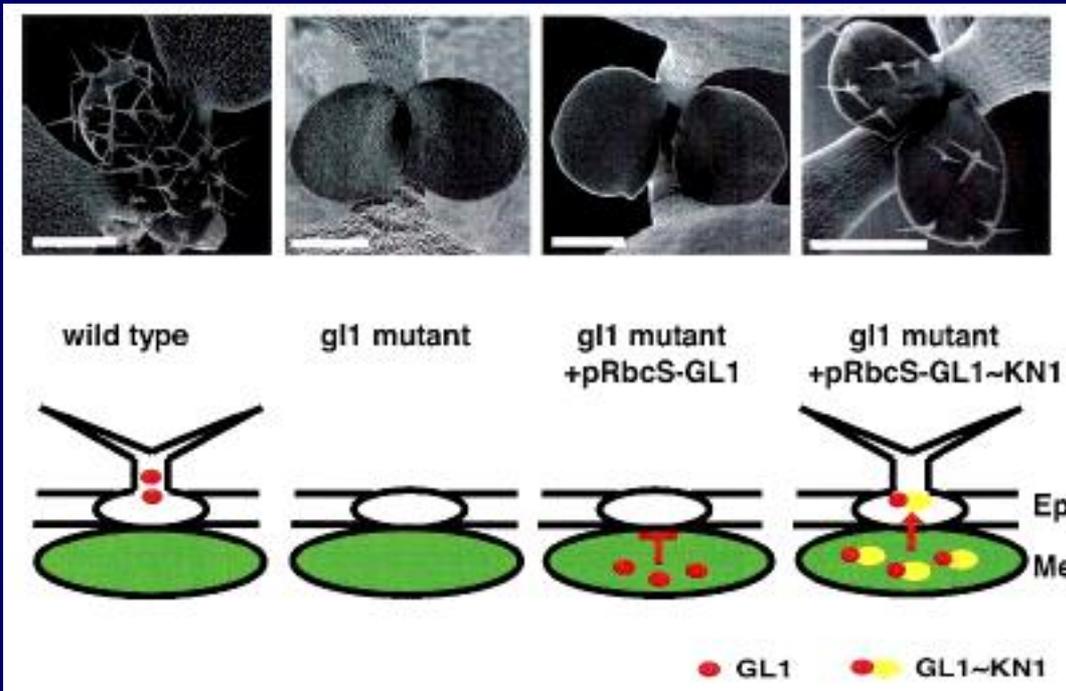
Results

Constructs
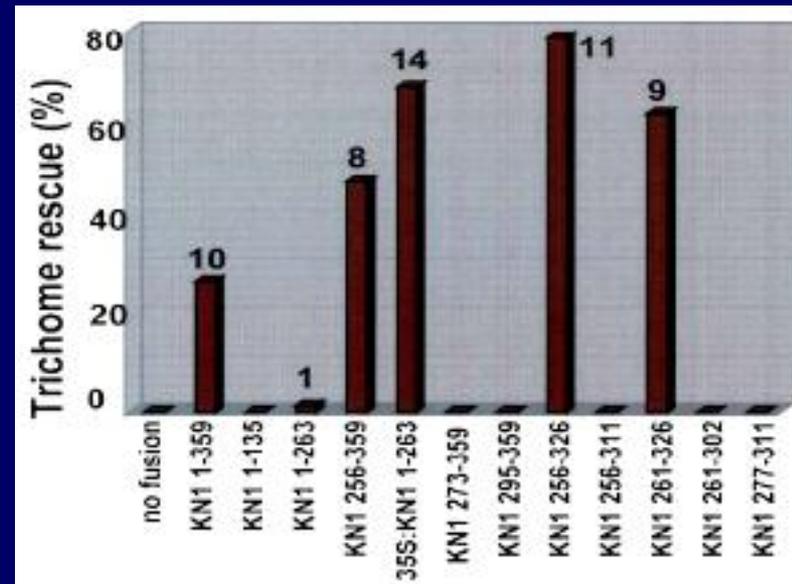
Kim et al. (2005) G&D 19, 788

Tassetto et al. (2005) EMBO Rep. 6, 885-890

Homeo domain of KN1 mediates trafficking
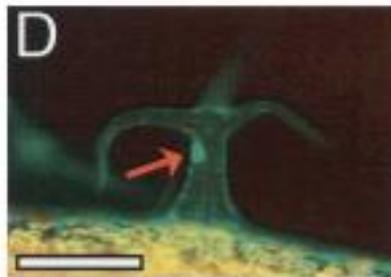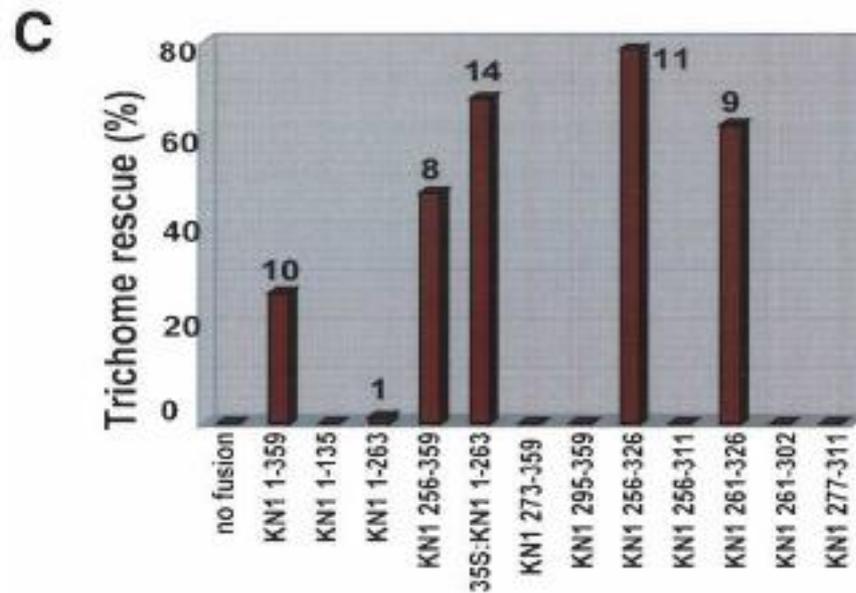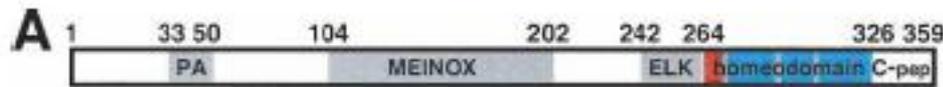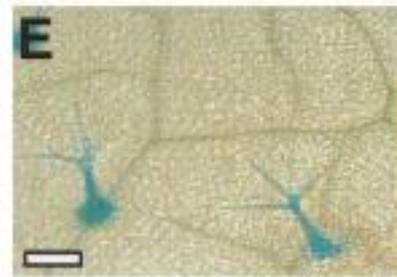
KN1 domains

homeo domain

KN1 fragments
fused to GL1

gl1; GL2::GUS
+ RbcS::GL1-GFP-KN1

GFP   GUS

TF trafficking mediated by some HDs
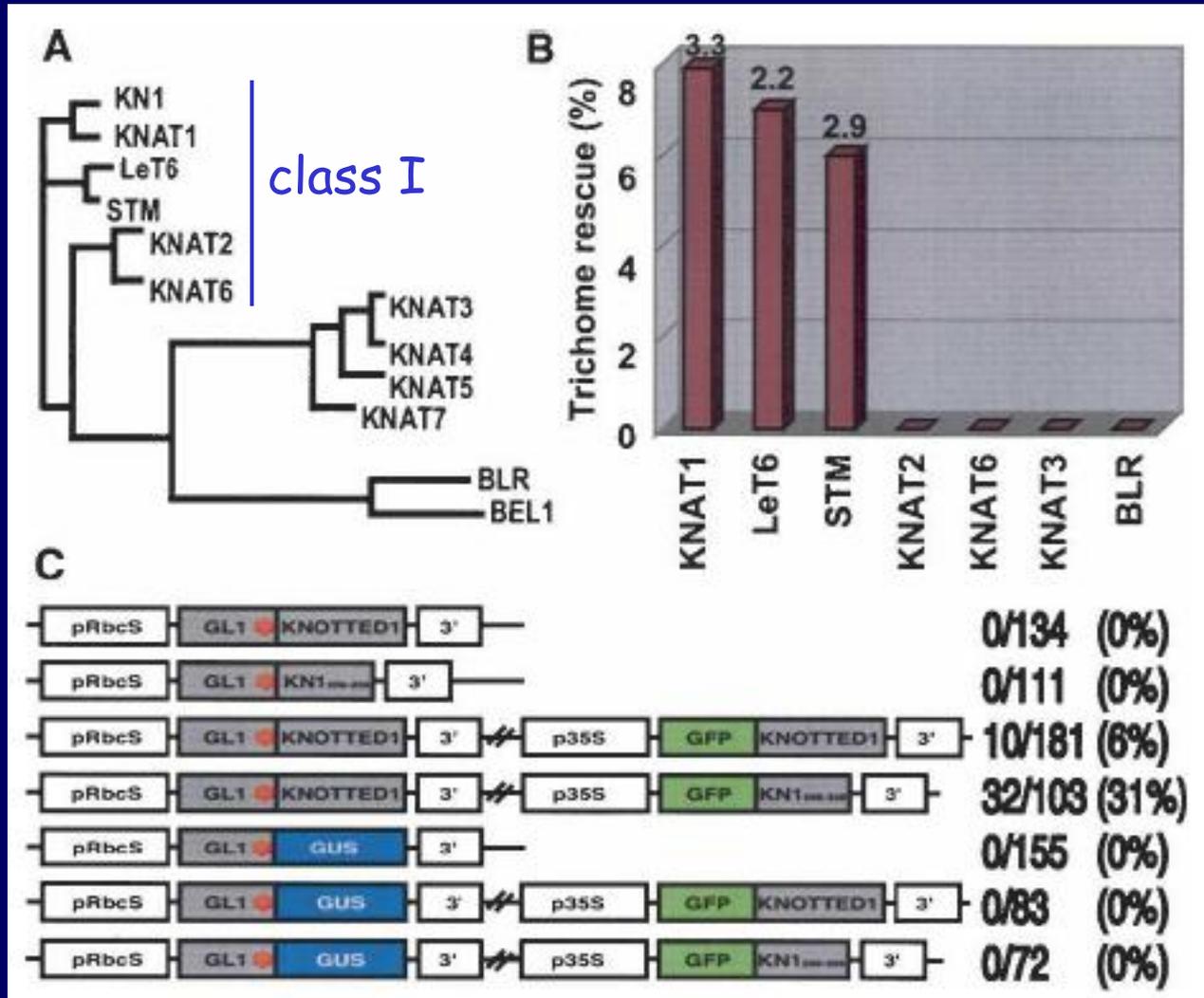
Class I KNOX homeo domains

mediate

trafficking

Root: Radial Patterning

Detective story of moving transcription factors
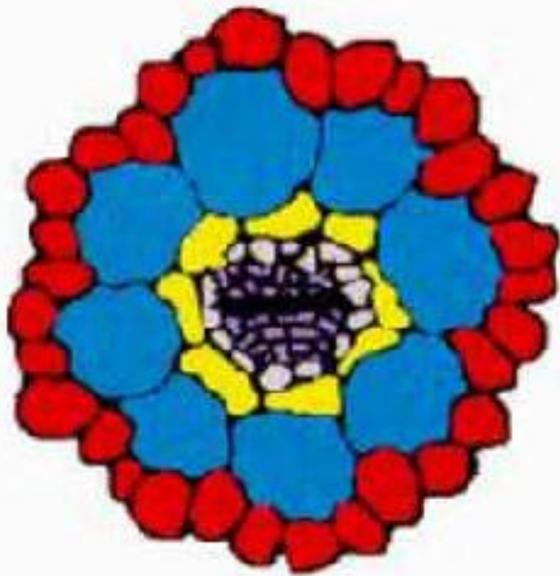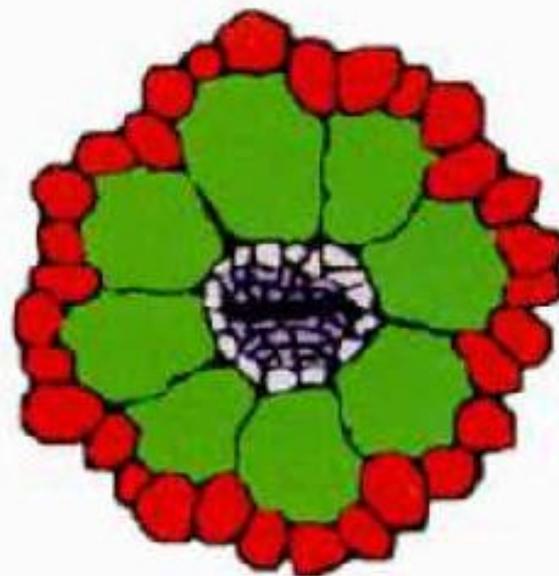
Wildtype · scarecrow · short root
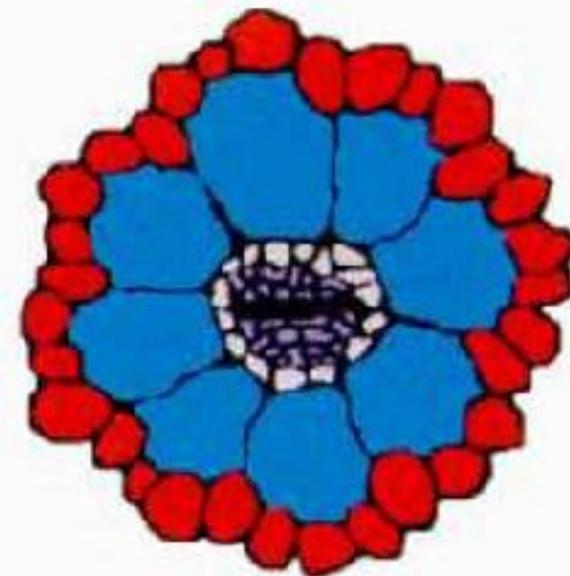
Cortex + Endodermis   Mixed (Cx+En)   Cortex

# SCR and SHR Expression + SHR Proteintransport

SCR Expression
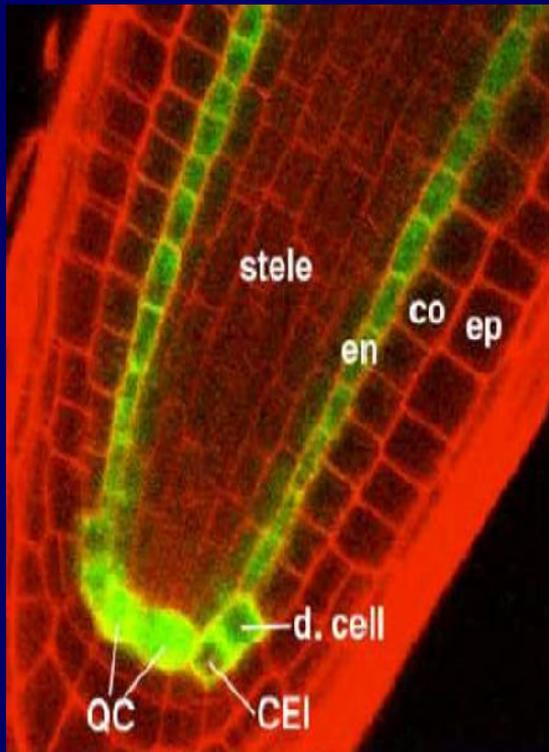
**SHR Expression**
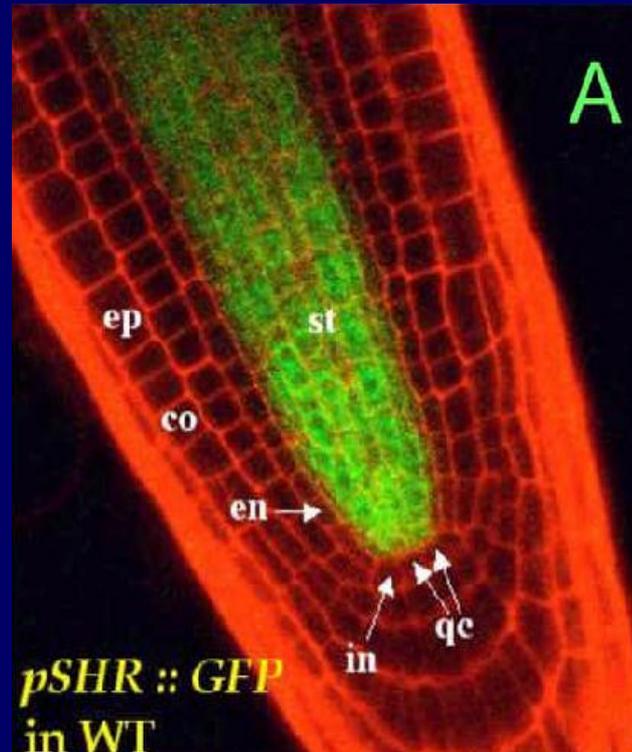
SHR Protein
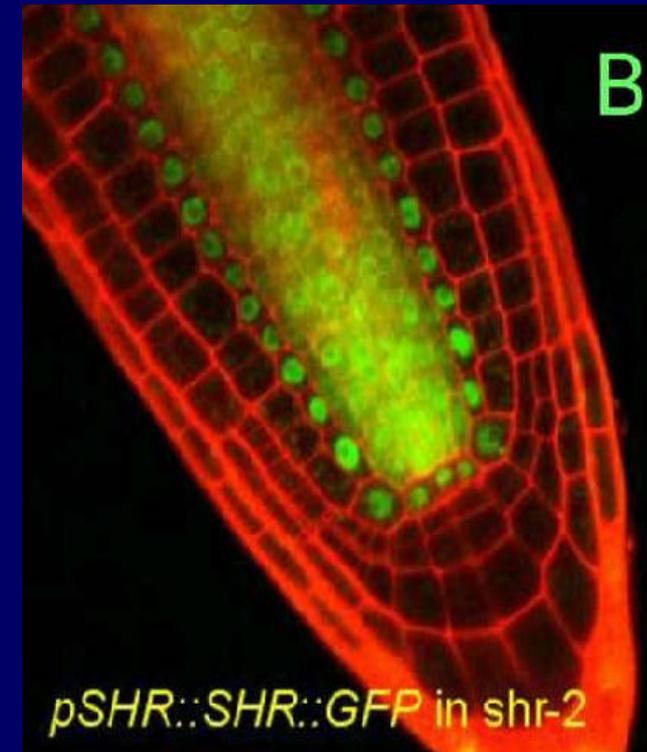
Expression and Protein
in Endodermis + QC

Expression
in Stele

Protein
in Endodermis + QC

Model for SHR und SCR Function
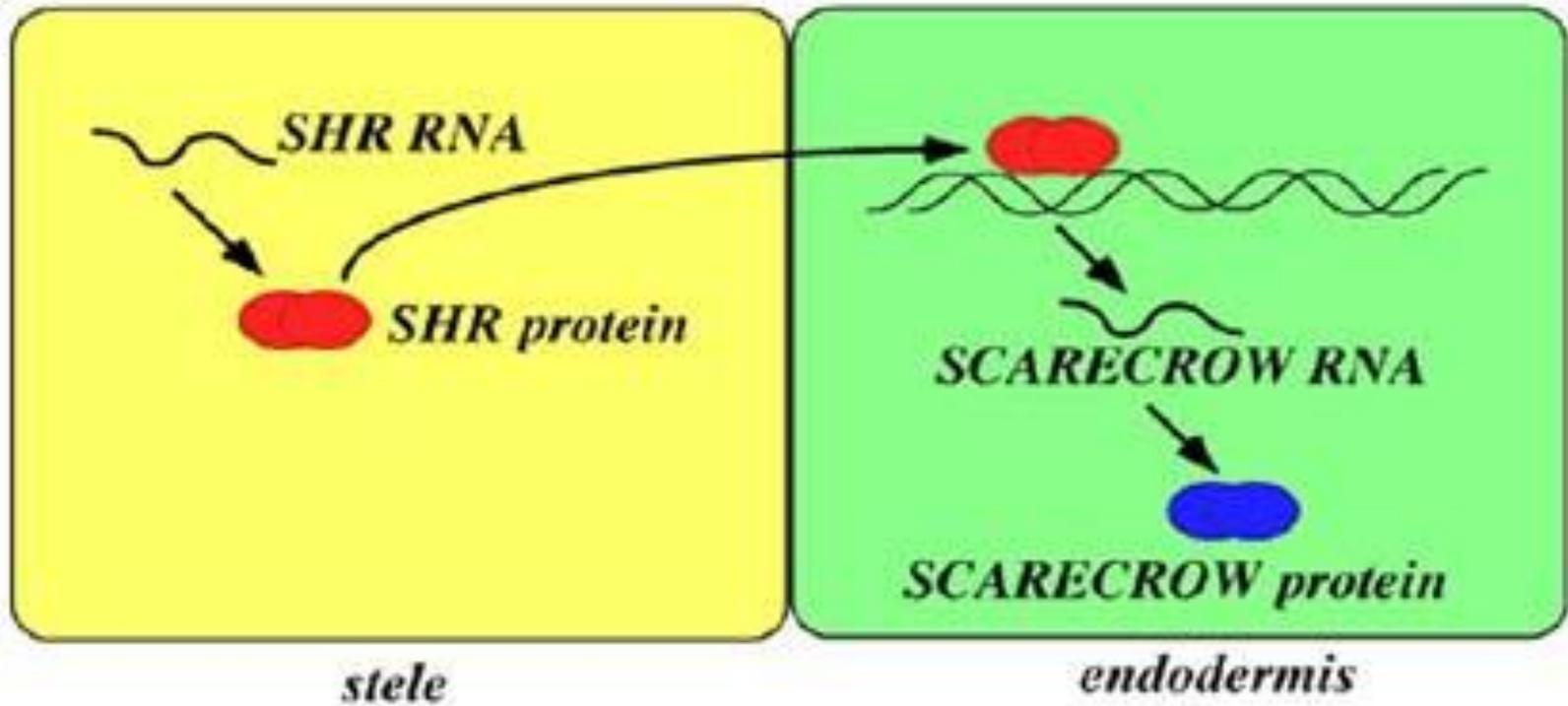
SCRp::SHR Expression: Mehr Endodermis
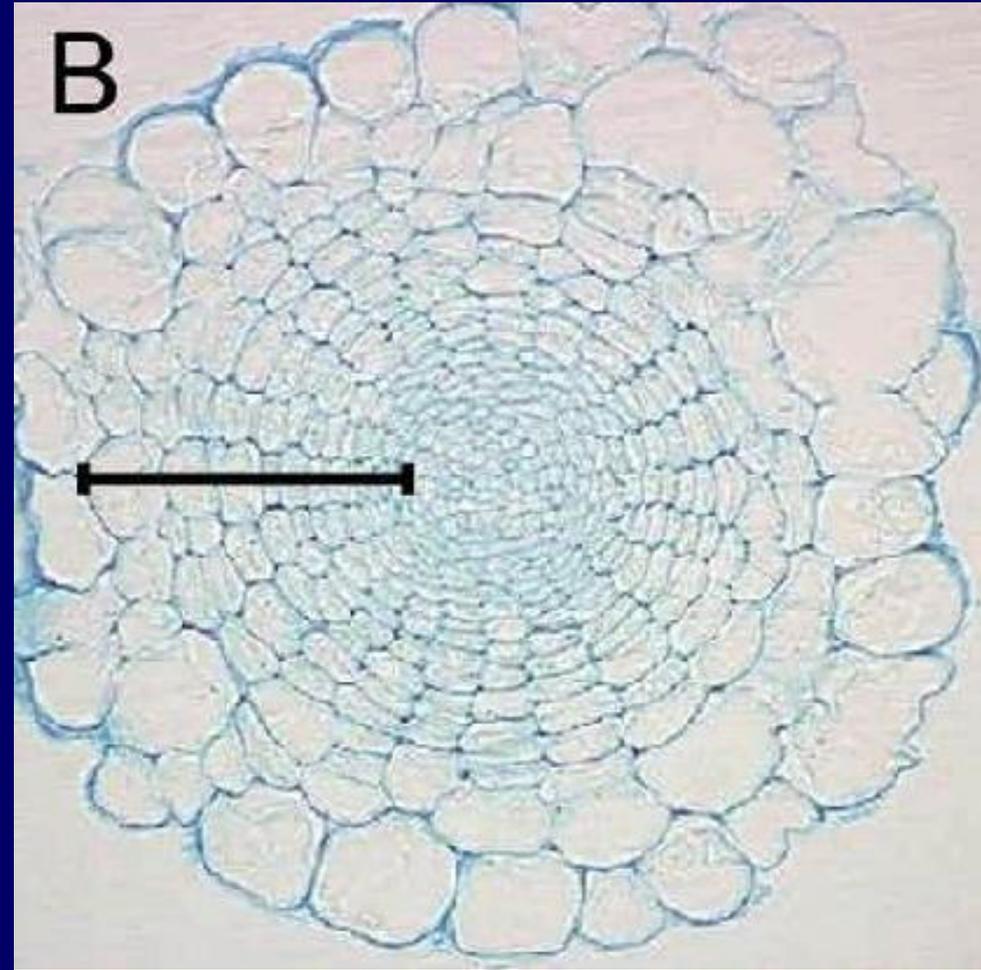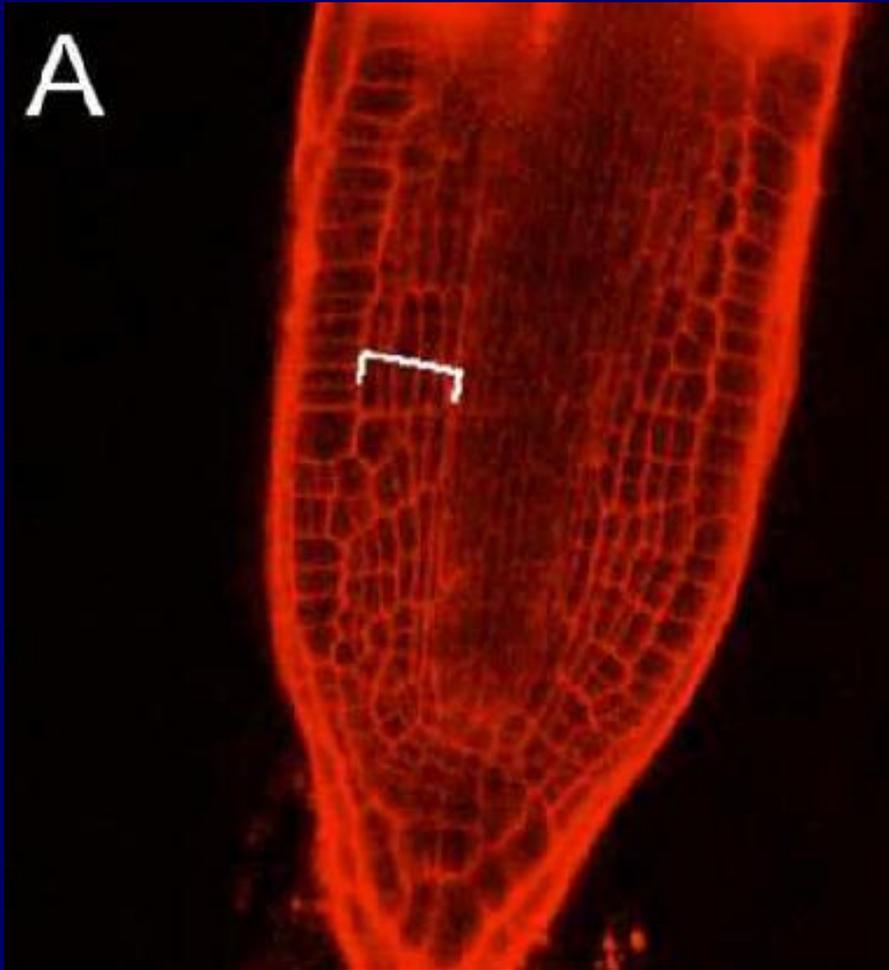
Interzellulärer Transport der Signale

- Importance of intercellular signals in totipotent plant cells with cell walls

- Diversity of signals: small molecules, RNAs, viroids, Peptides, Transcription factors

- <u>Plasmodesmata</u>: special Organelles for connecting cells
    - static and dynamic „<u>size exclusion limit</u>"
    - modification of plasmodesmata during
        plant development

- Examples of intercellular signalling (e.g. Endodermis, Root hair Specification)