Discovering the Roles of Myosin and Exocyst Proteins in Cell Expansion of *Arabidopsis thaliana*

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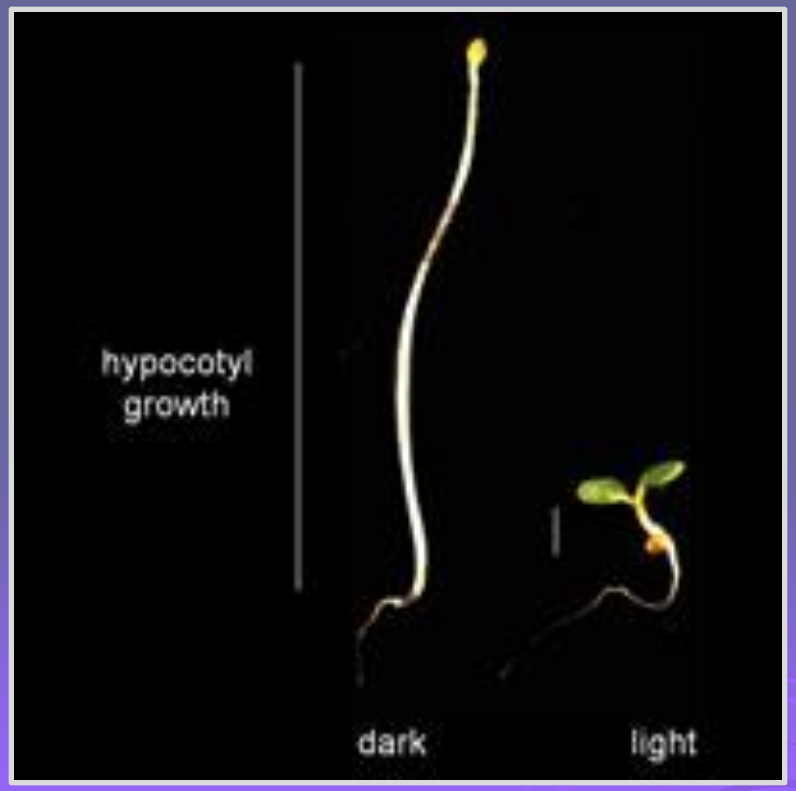
Arabidopsis thaliana as a Genetic Model

- Its genetics are well known
- Many mutant lines
- Grows quickly
- Agricultural benefits
  - Closely related to mustard, kale, broccoli, and cauliflower
  - Relevant to all crop plants
- Use the Col-0 wild type (WT)

Hypocotyl of *Arabidopsis thaliana*

- Diffuse cell expansion



- *Exo70a1*-2 and *Exo84b*: known to have shorter hypocotyls

Root Hairs of Arabidopsis

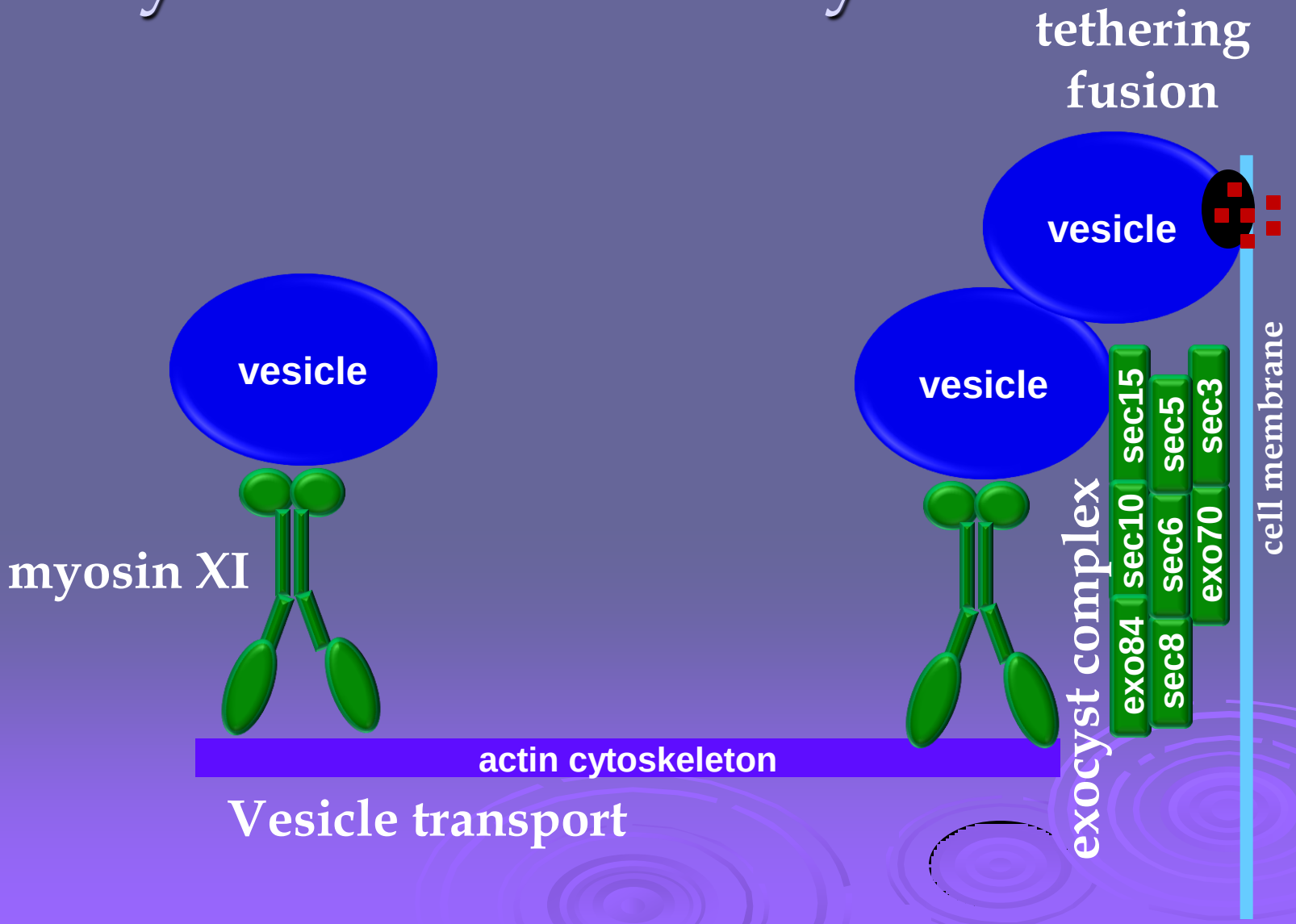
- Root Hair cells grow at the tip
- Measure the effects of the absence of a myosin or exocyst protein
- Determine which proteins are important for tip growth

*scale bars: 200 um

Myosins XI and Exocyst Function in Cell Expansion

- It is already known that myosin and exocyst proteins function in cell expansion
- Yet it is unknown whether they work together in diffuse cell expansion and tip growth

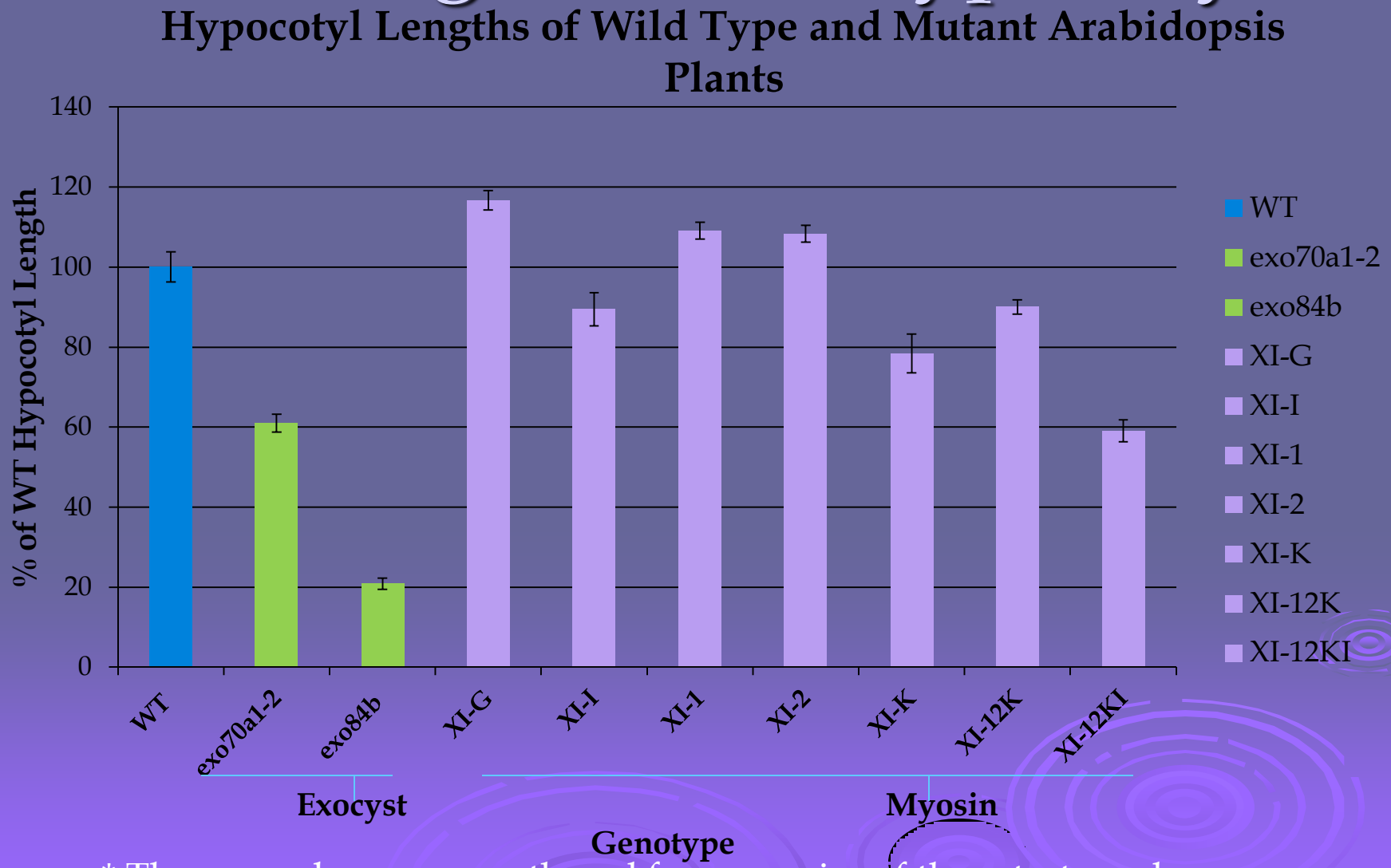
Hypothesis: Myosin XI and Exocyst interaction



Main Focus

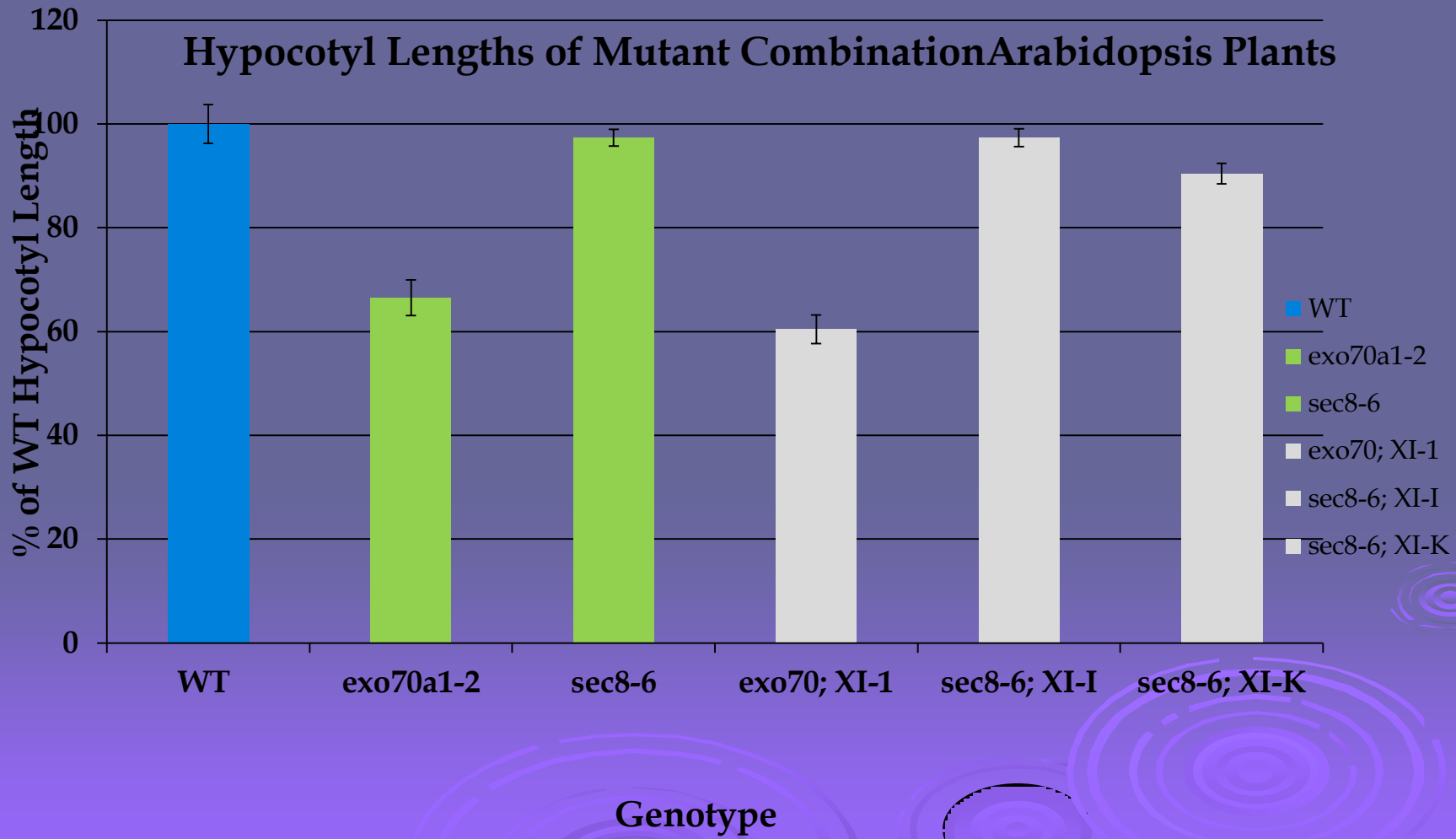
- Which, if any, myosin XI proteins and exocyst proteins play a role in growth of hypocotyls and root hairs?
- Why are mutant hypocotyls shorter?
- Why are mutant root hairs shorter?
- Do myosin XI proteins and exocyst proteins interact?

Interesting Mutant Hypocotyls



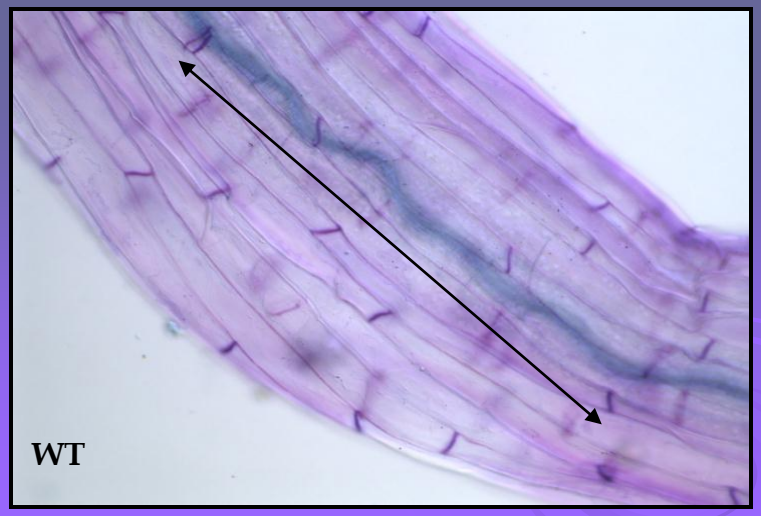
* These numbers were gathered from a series of three tests and compared to the Wild Type grown on the same day.

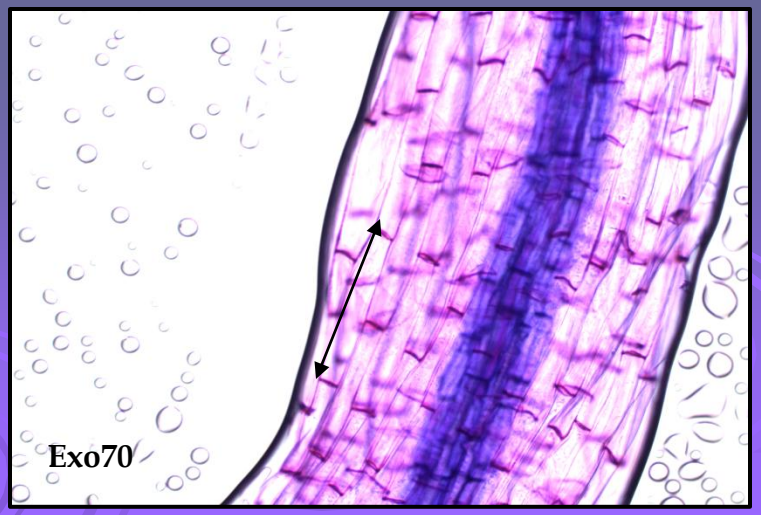
Interesting Mutant Combinations



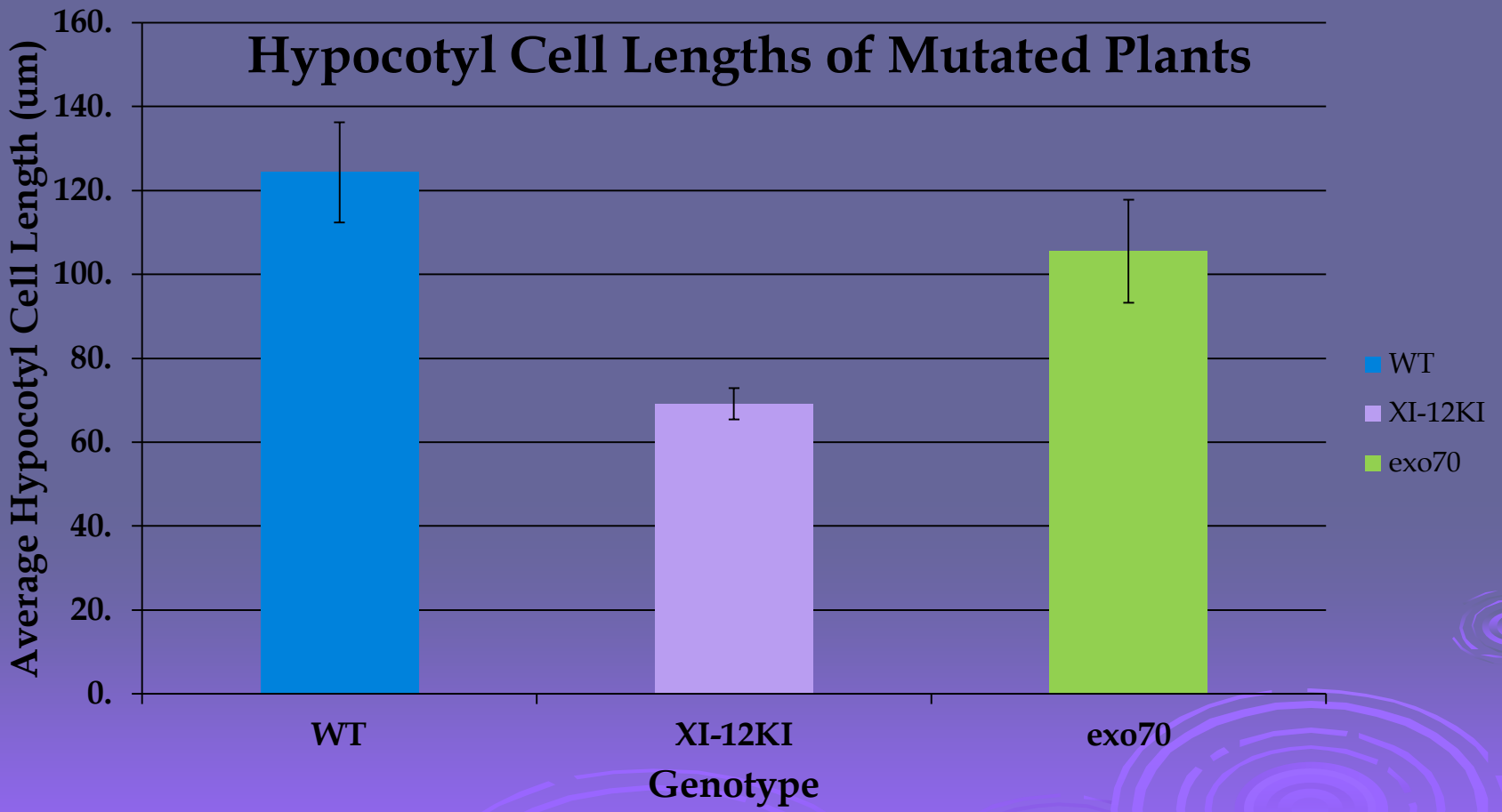
Hypocotyl Cell Length

- Do mutants with shorter hypocotyls than WT have shorter cells in the hypocotyl or less cells?
- Stain cell walls with toluidine blue solution



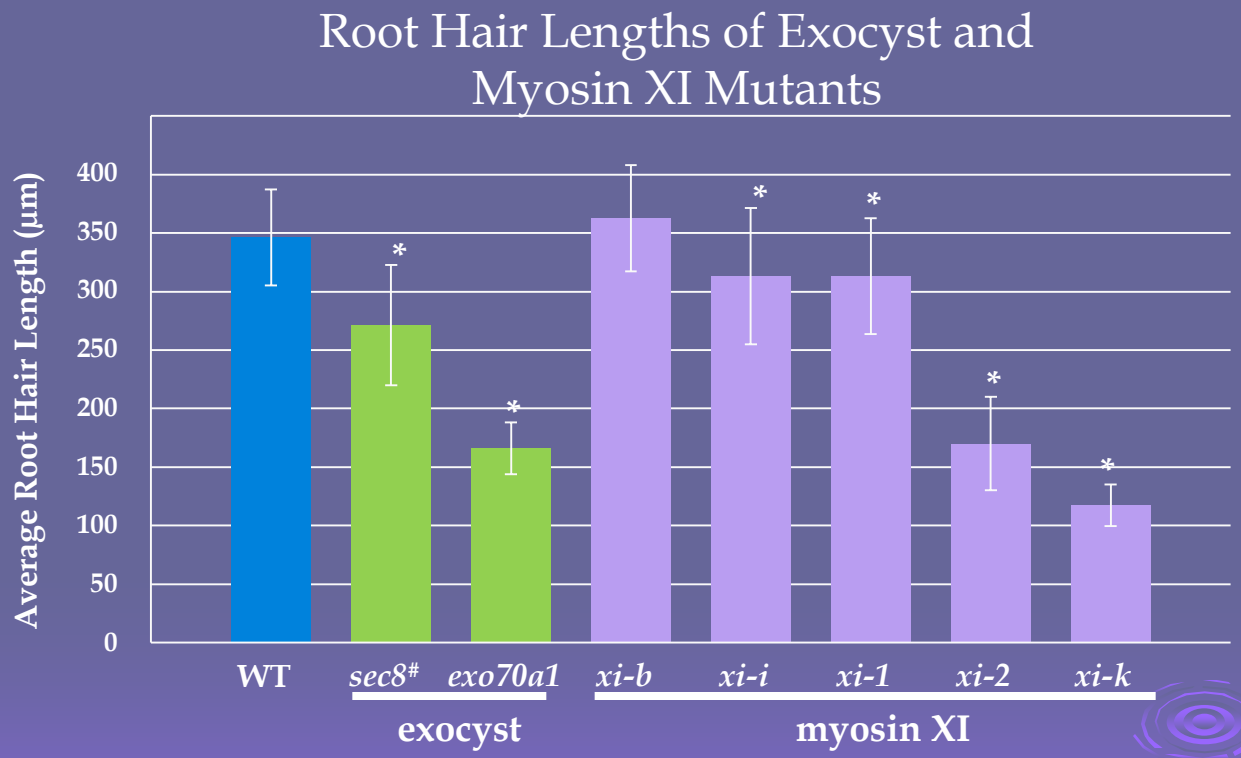


Hypocotyl Cell Length



Root Hair Measurements

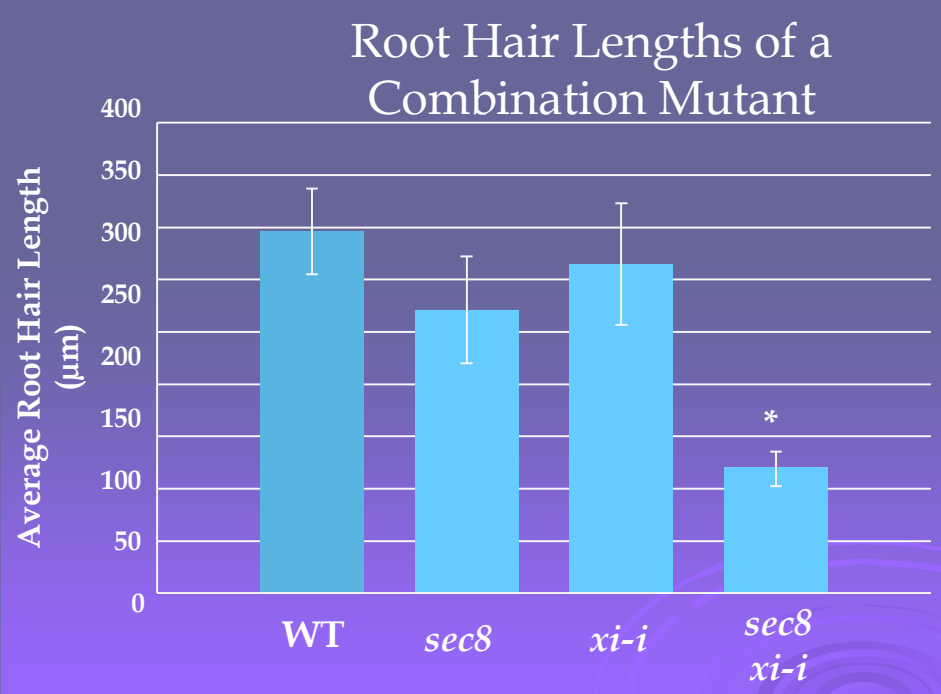
- Exocyst affects root hairs and hypocotyls
- Myosin has a stronger effect on root hairs than hypocotyls

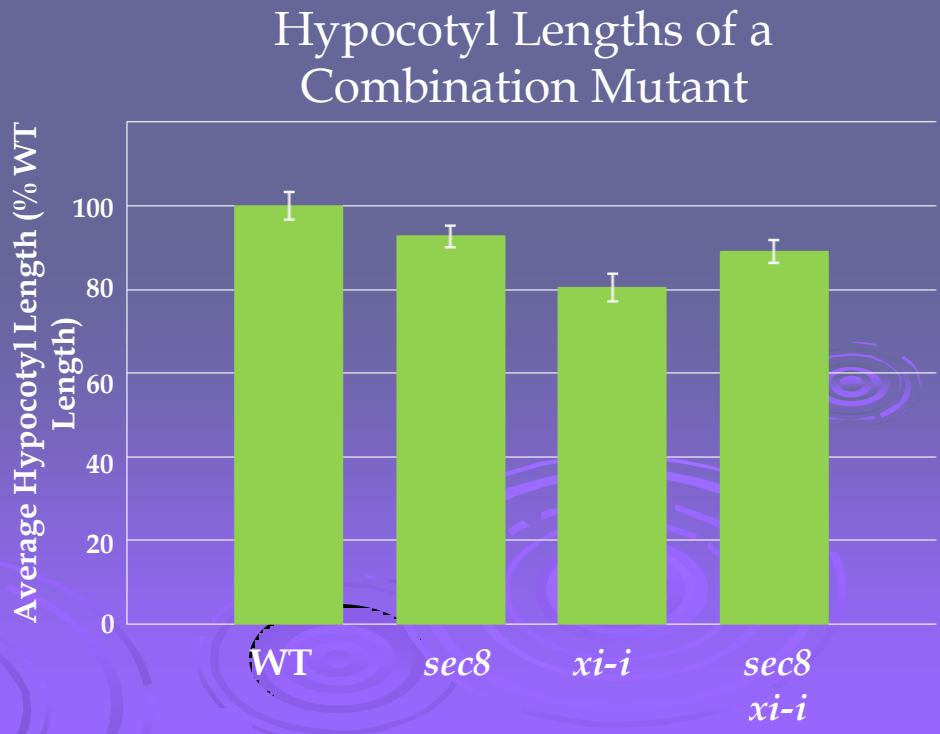


** Previous work done by Dr. Amy Klocko

Exocyst and Myosin Double Mutants

- Loss of both SEC8 and XI-I has strong effect on the root hairs and no effect on hypocotyls





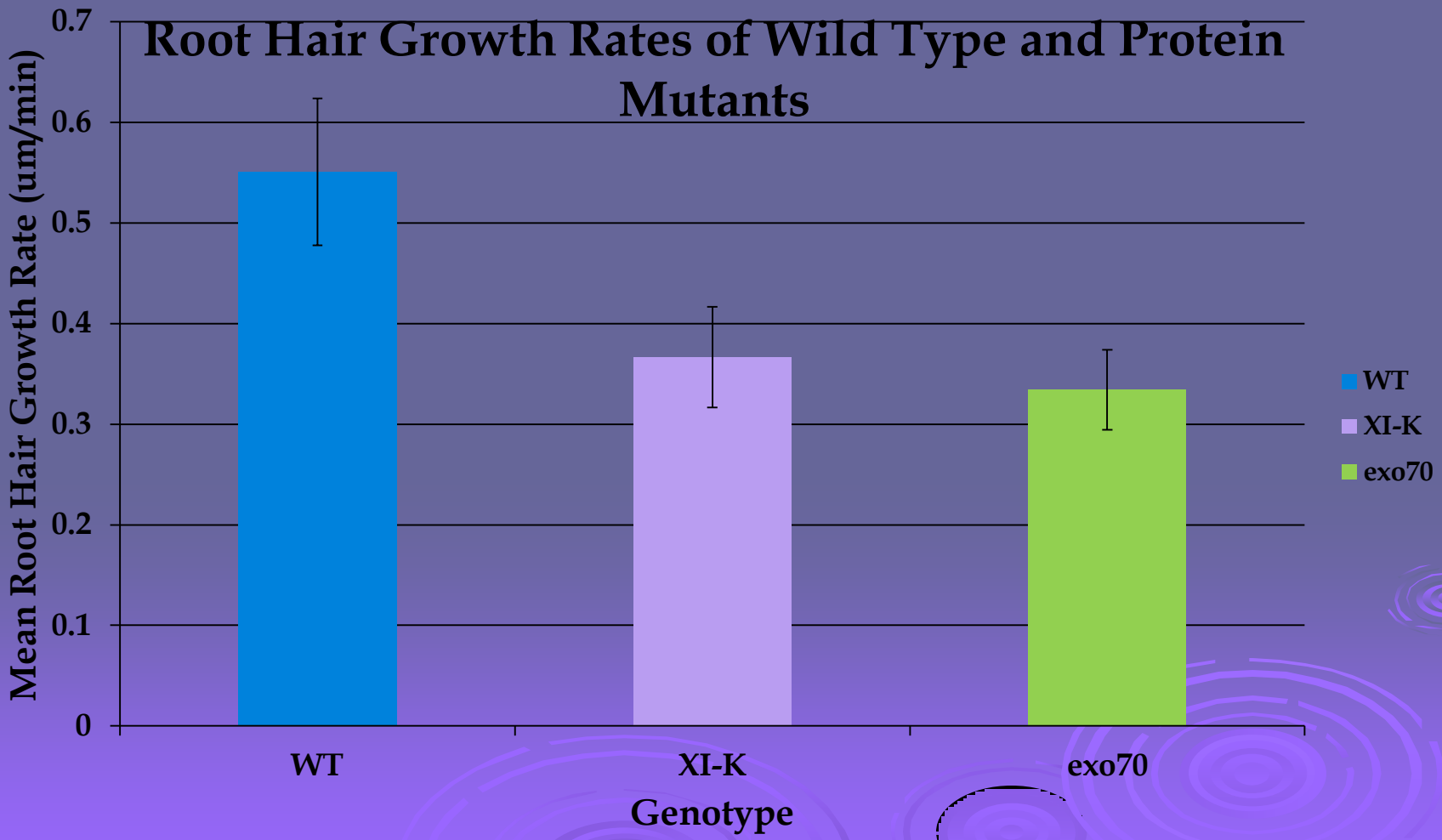
Root Hair Time Lapse

- Root hair cells are shorter in some mutants.
- Exo70 and XI-K mutants
- Do they grow slower or grow at same rate and stop at a certain point?

exo70 movie 1 - Copy.avi

Exo70 root
30 min time lapse

Root Hair Time Lapse



Discussion

- Exocyst and Myosin XI proteins are important for growth in the hypocotyl and root hairs.
- May not work together in hypocotyl growth.
- Hypocotyl cells of myosin XI mutants are shorter than WT.
- Exo70 and XI-K root hairs grow at a slower rate than WT root hairs.
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I would like to thank…

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Dr. Maria Ivanchenko

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