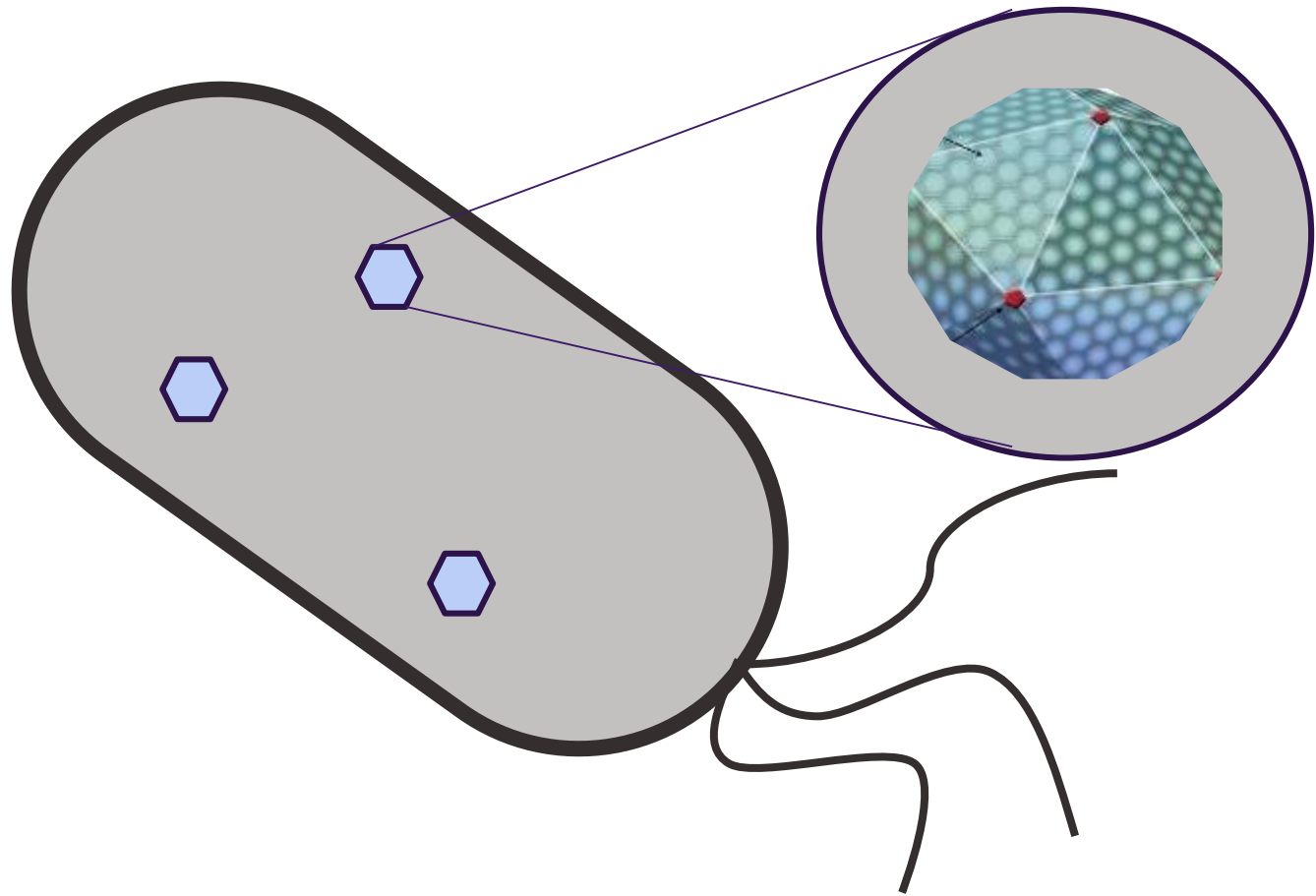


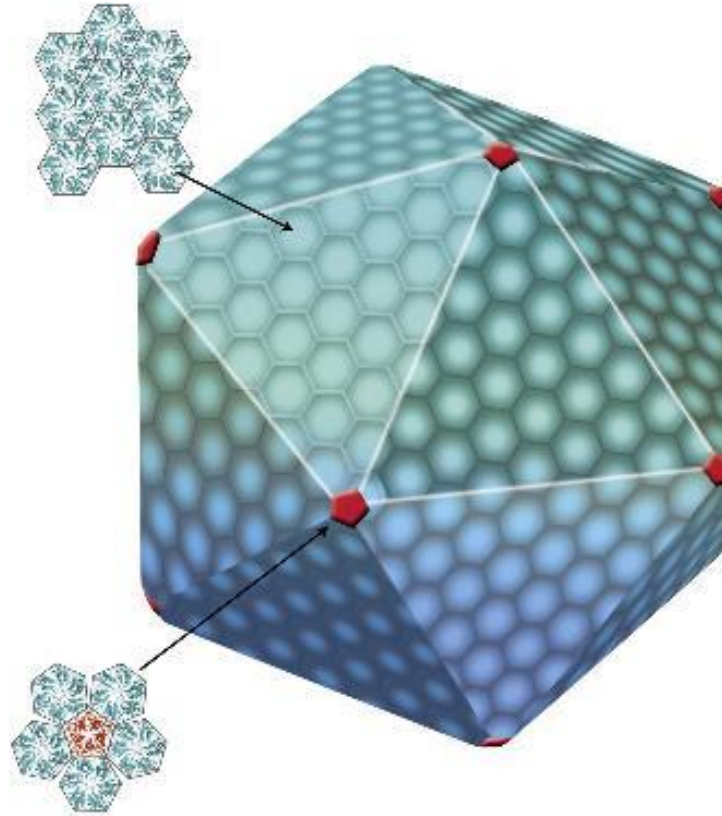
REDUNDANT FUNCTION OF PDUA AND PDUJ IN BACTERIAL MICROCOMPARTMENT FORMATION

Henry Raeder
Tullman-Ercek Laboratory
29 May 2019

What is a microcompartment?

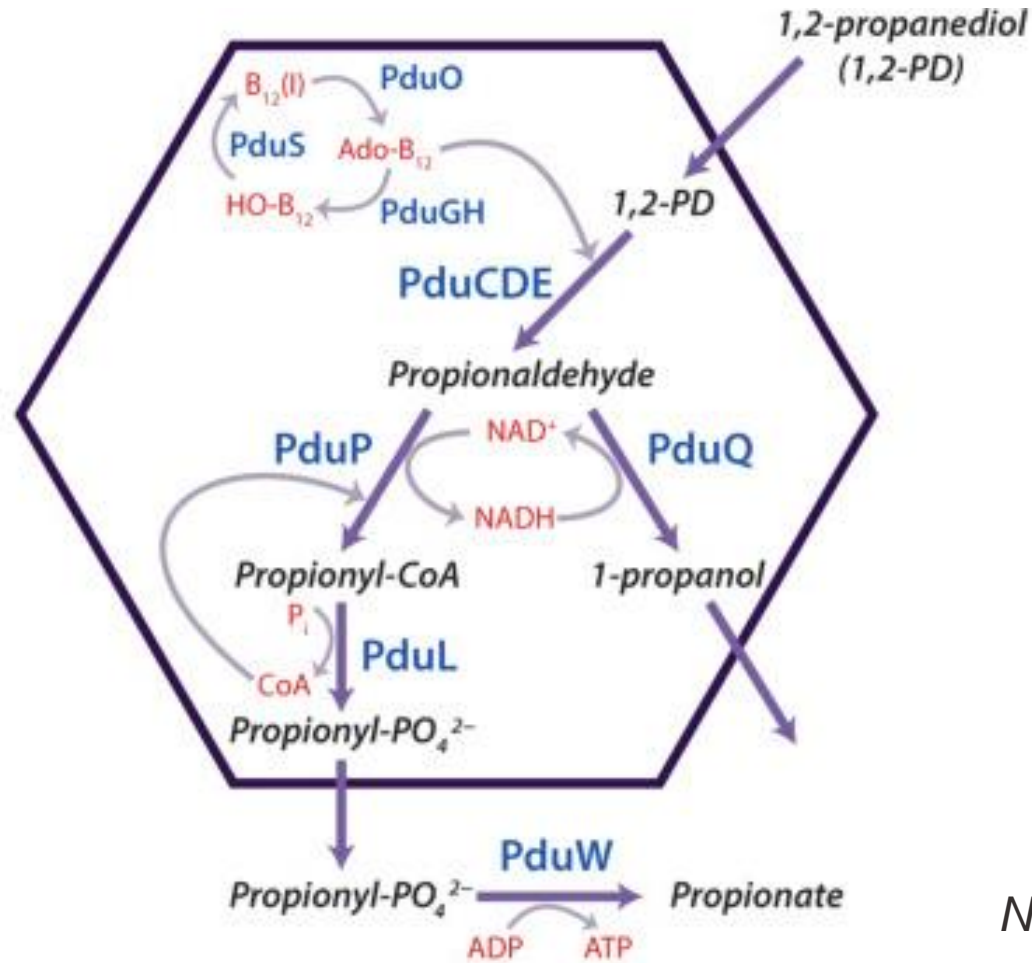


What is a microcompartment?



Parsons 2010

What is a microcompartment?



Nichols et al. 2019

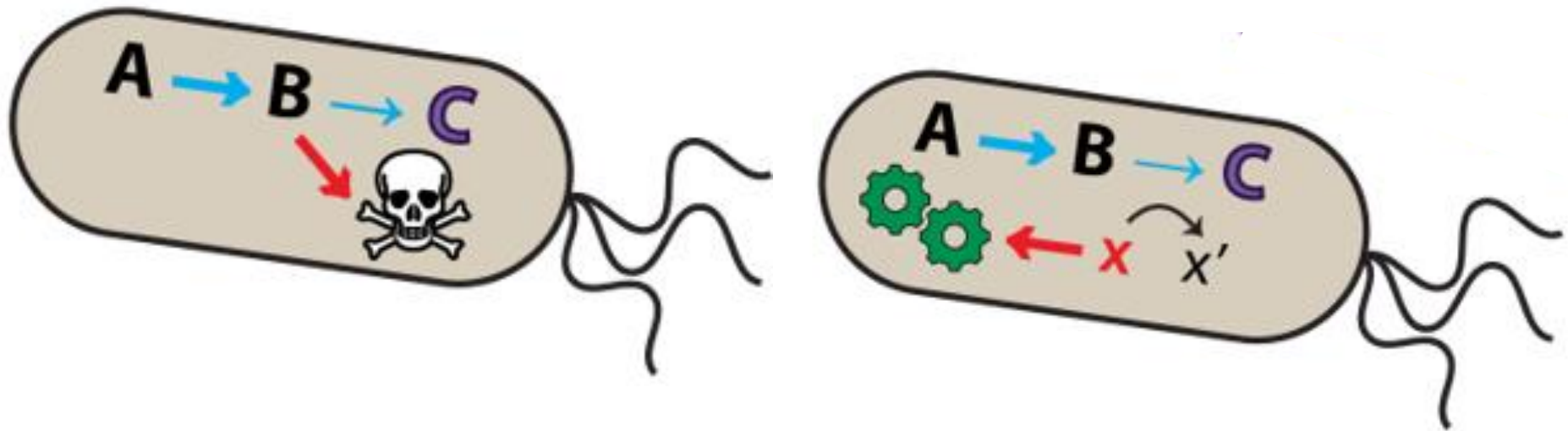
What is a microcompartment?



Standard Metabolic Engineering Pathways can have Severe Issues

Accumulation of Toxic Intermediates

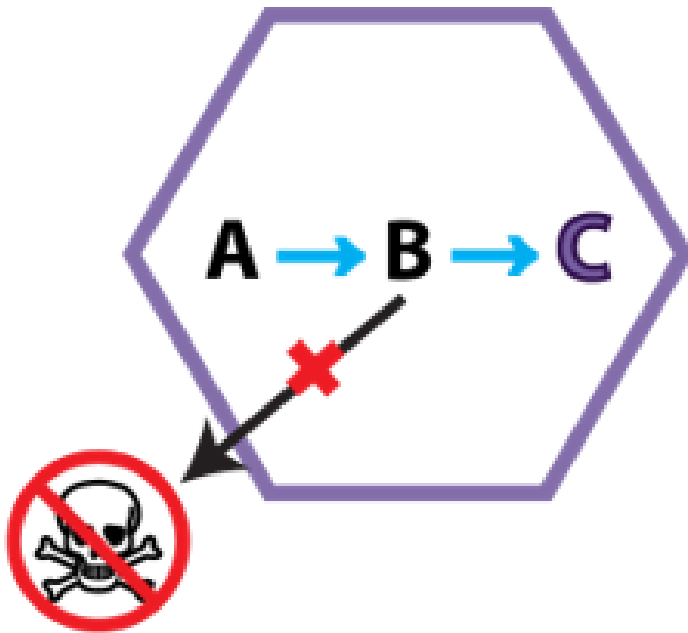
Cofactor Imbalances and Resource Competition



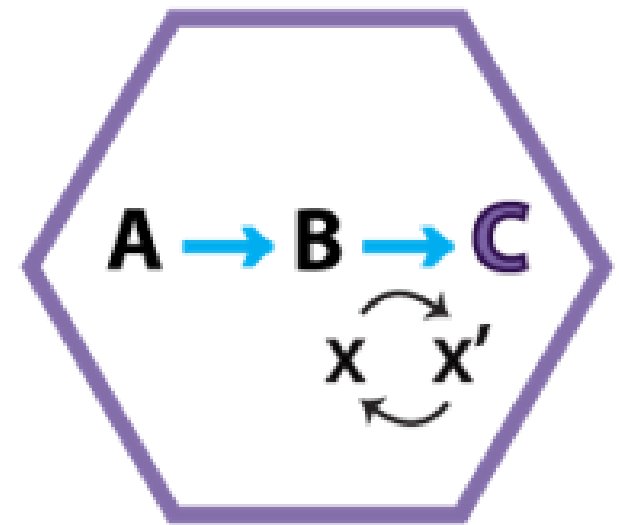
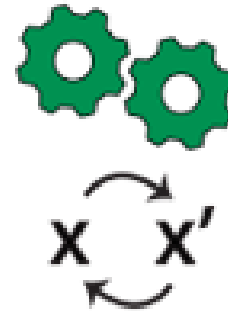
Nichols 2019

These Issues can be Solved using Microcompartments

Sequestration of Toxic Intermediates



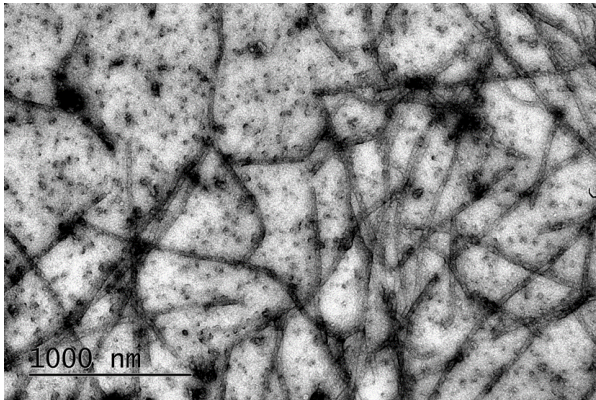
Private Cofactor Pools



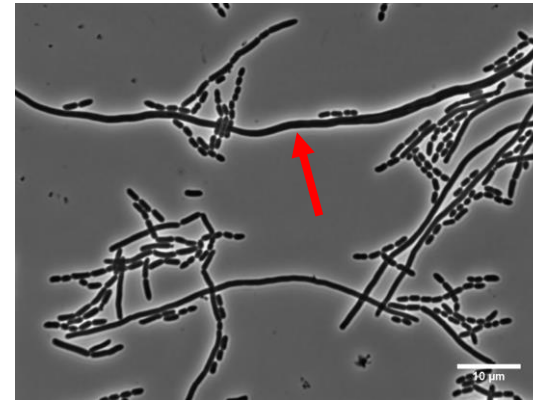
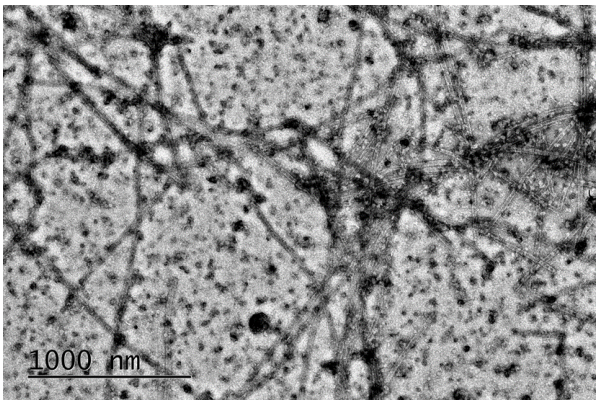
Nichols 2019

Problem: We don't fully understand how they form

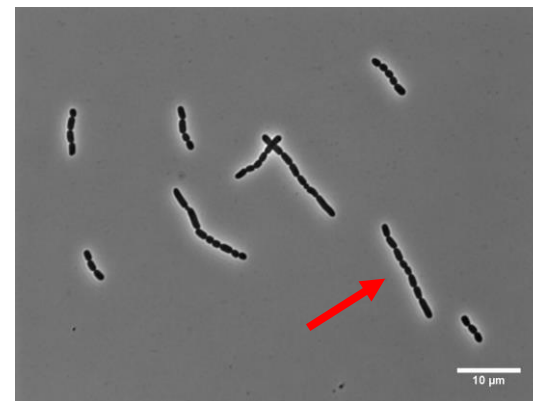
TEM of purified PduA



TEM of purified PduJ



E. coli expressing PduA (phase contrast)

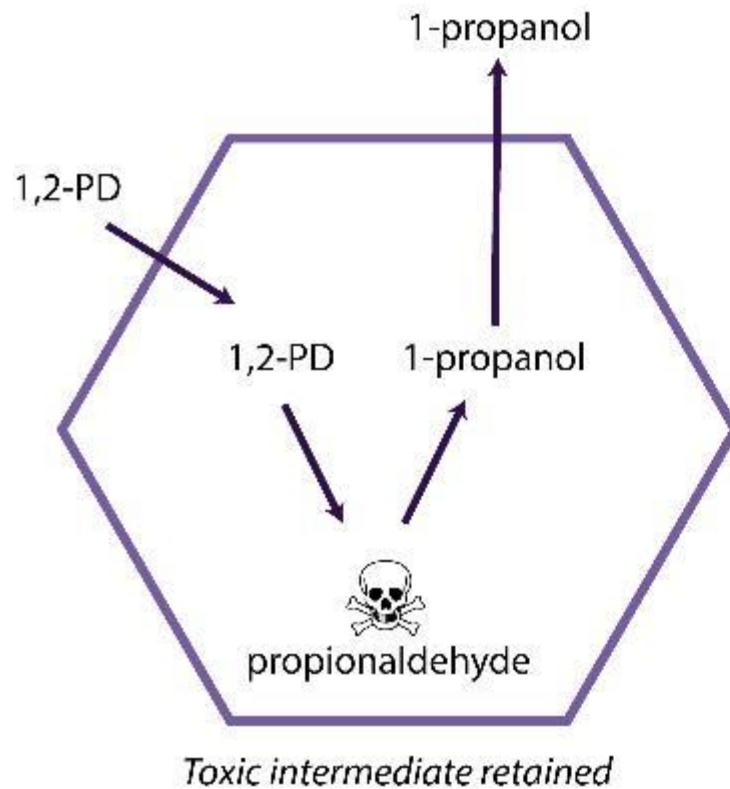


E. coli expressing PduJ (phase contrast)

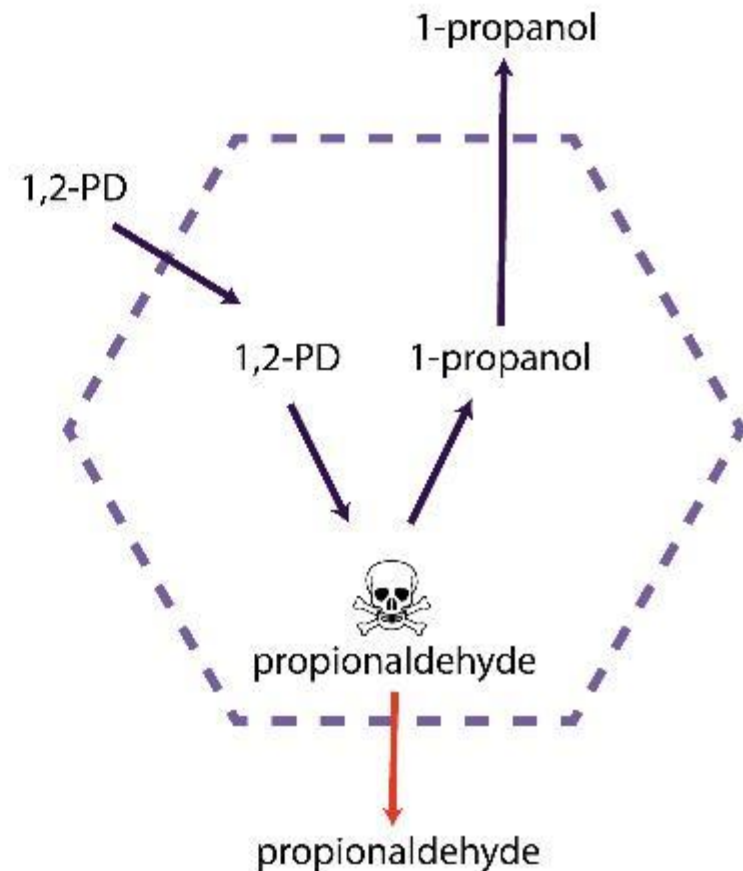
*Scale = 10 μm

General Procedure

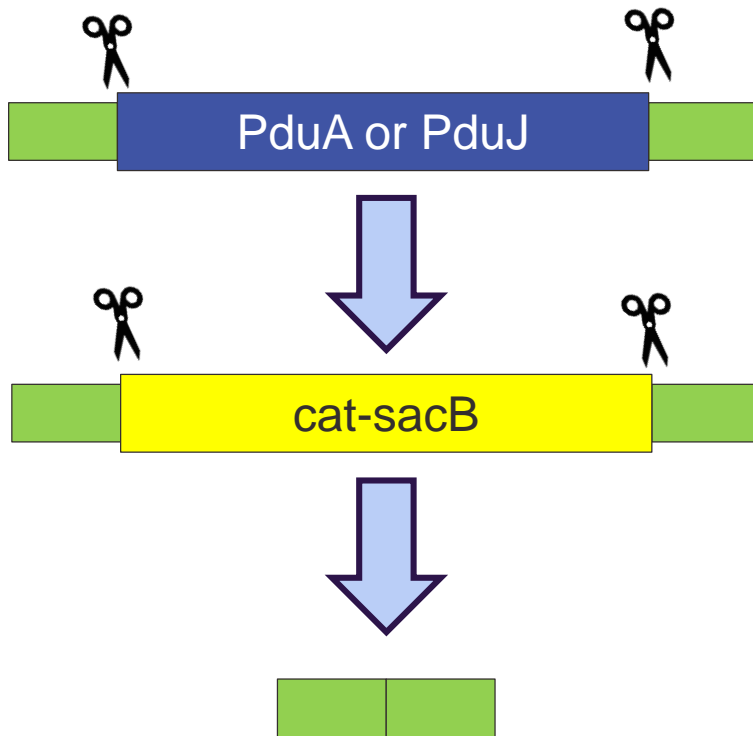
Wild-Type Microcompartments



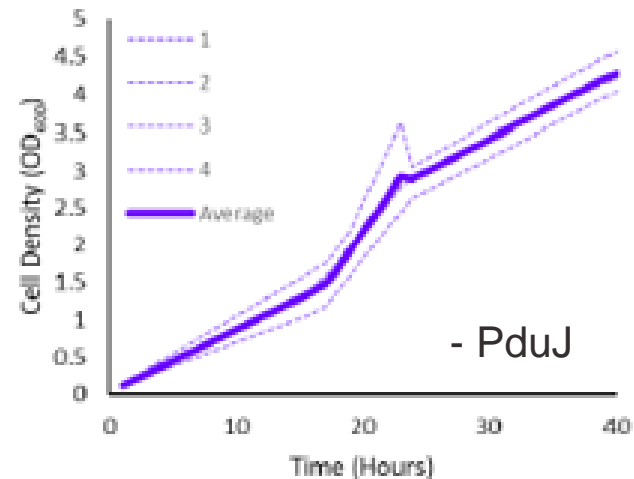
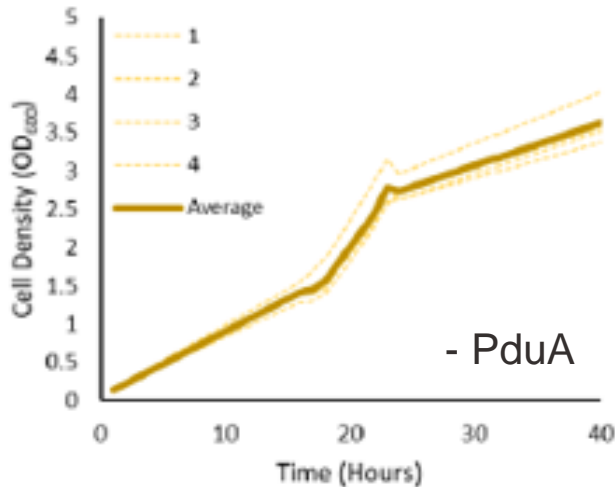
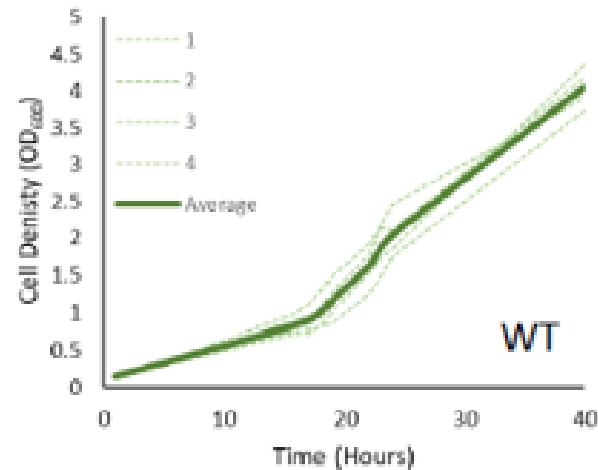
Leaky Microcompartments



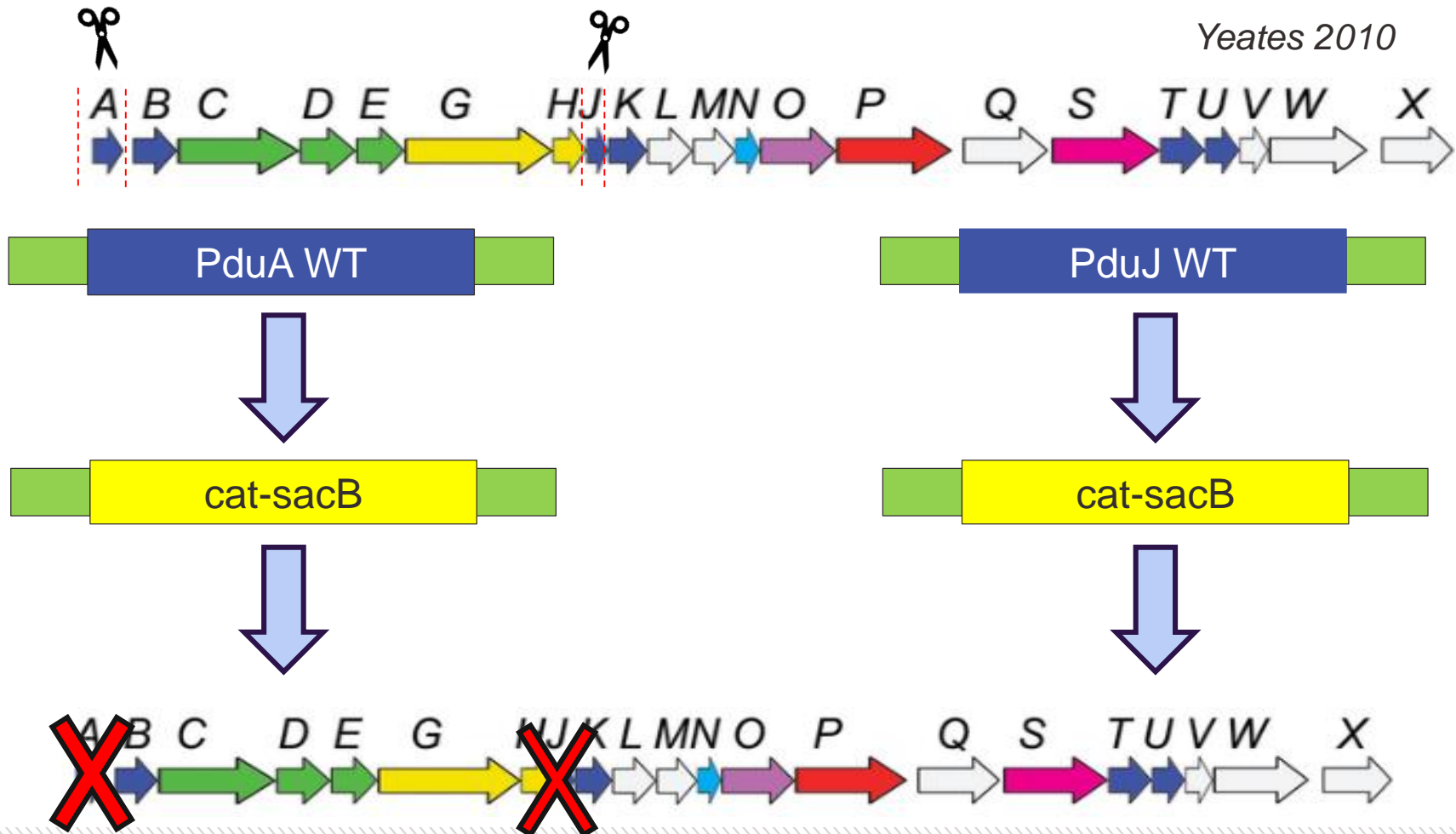
Creating and Measuring a Knockout



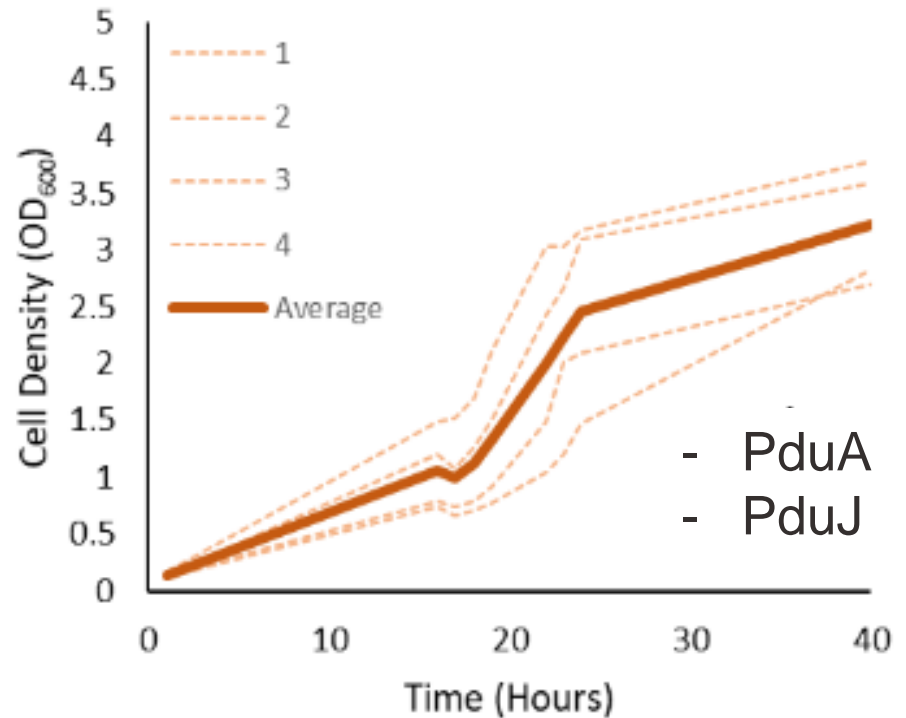
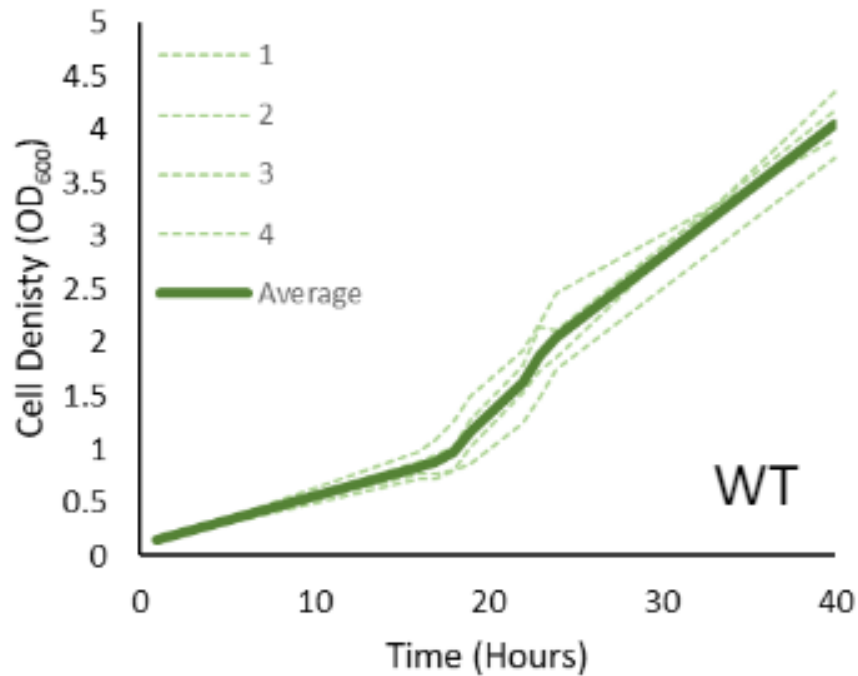
Knocking out PduA or PduJ does not affect Growth



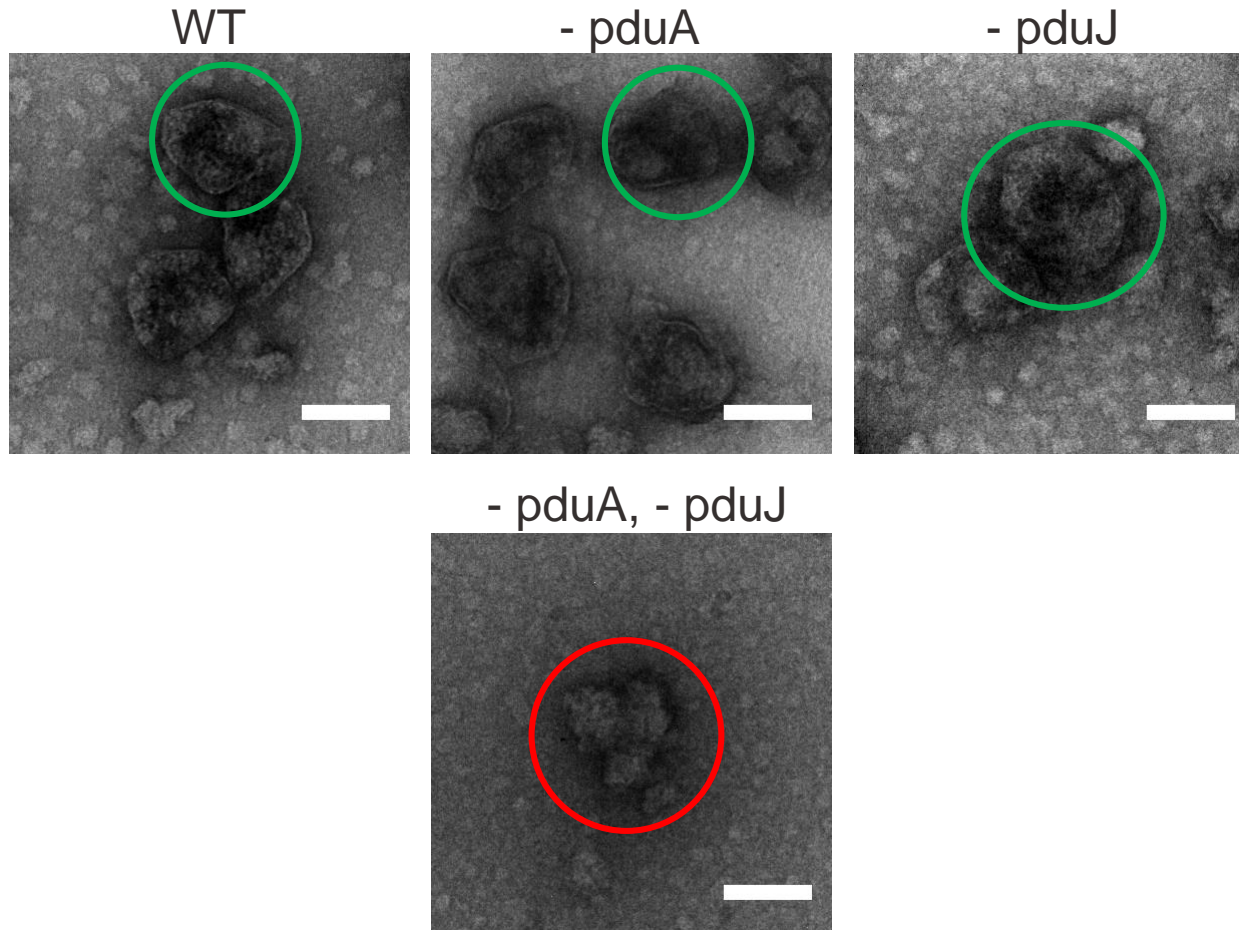
The Goal: Creating and Testing a Double Knockout



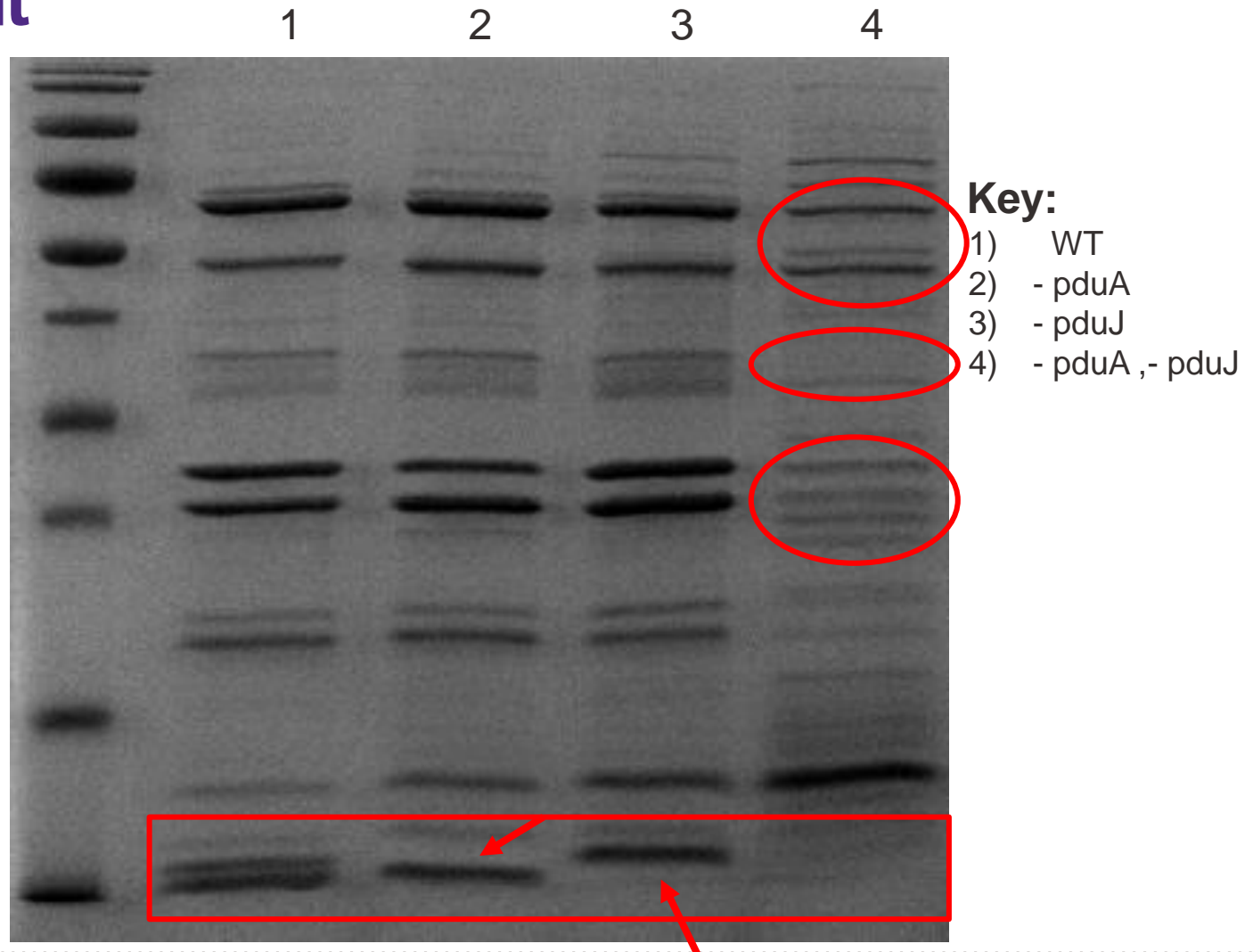
Growth of the Double Knockout is inconsistent



Double Knockout shows no Microcompartment Formation



Microcompartment Purification indicates a lack of compartment formation in the double knockout



Conclusions and Future Goals

- PduA and PduJ appear to have redundant function
- Rescue formation with plasmid vector
- Test library of mutant PduA and PduJ for functional mutant

Acknowledgements

Danielle Tullman-Ercek, PhD

Han Teng Wong

Lisa Burdette

Mary Slininger Lee, PhD

Emily Hartman

Taylor Nichols

Charlotte Abrahamson

Bon Ikwuagwu

Nolan Kennedy

Yusu Chen

Sam Leach

Julie Liang

Min-Kyoung Kang, PhD

Svetlana Ikonomova, PhD

