

ST131 *E. coli*

Pandemic, clonal population

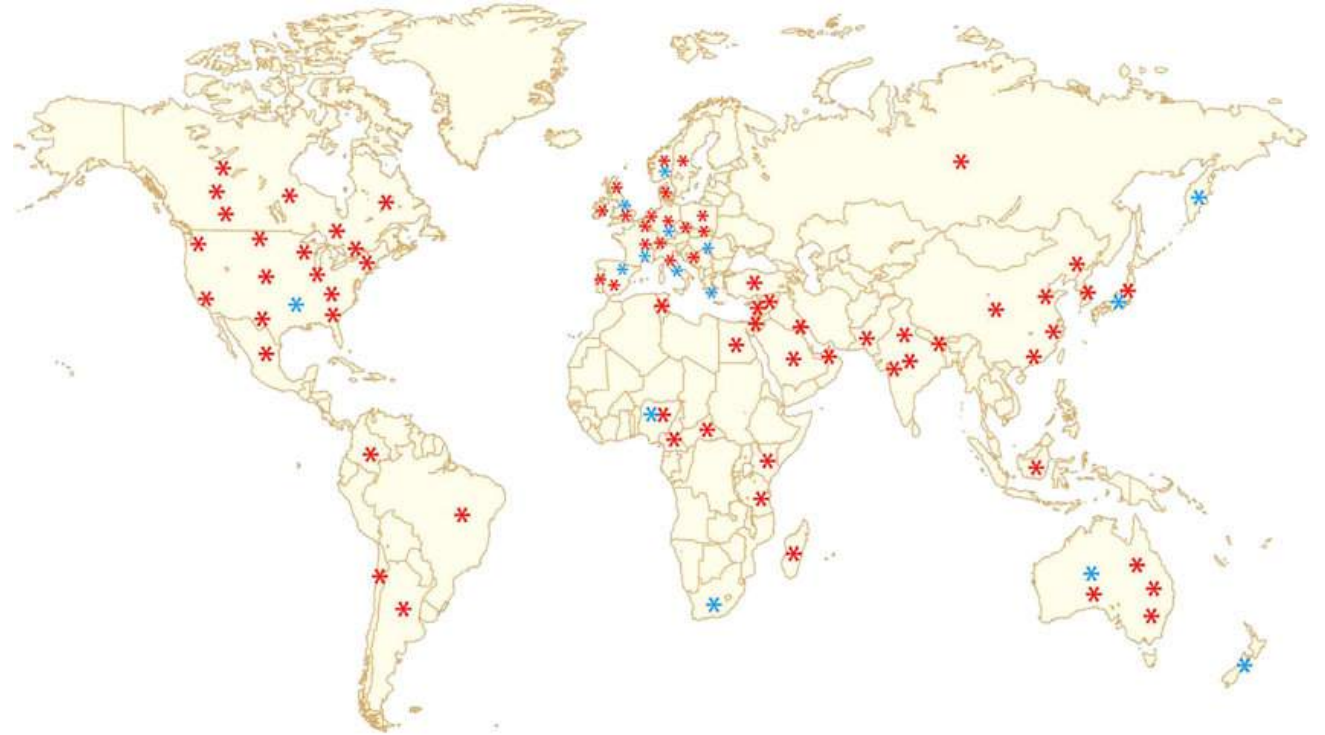
ExPEC – Extraintestinal pathogenic *E. coli*

Known to harbor CTX-M-15

Most common ExPEC, likely responsible for most AMT *E. coli* infections in US

Shown to outperform non-ST131 ExPEC in cell invasion and adhesion

How does ST131 maintain its large AMR profile without losing virulence?



Nicolas-Chanoine, M. H., Bertrand, X., & Madec, J. Y. (2014). *Escherichia coli* ST131, an intriguing clonal group. *Clinical microbiology reviews*, 27(3), 543-574.

How ST131 Populations Survive

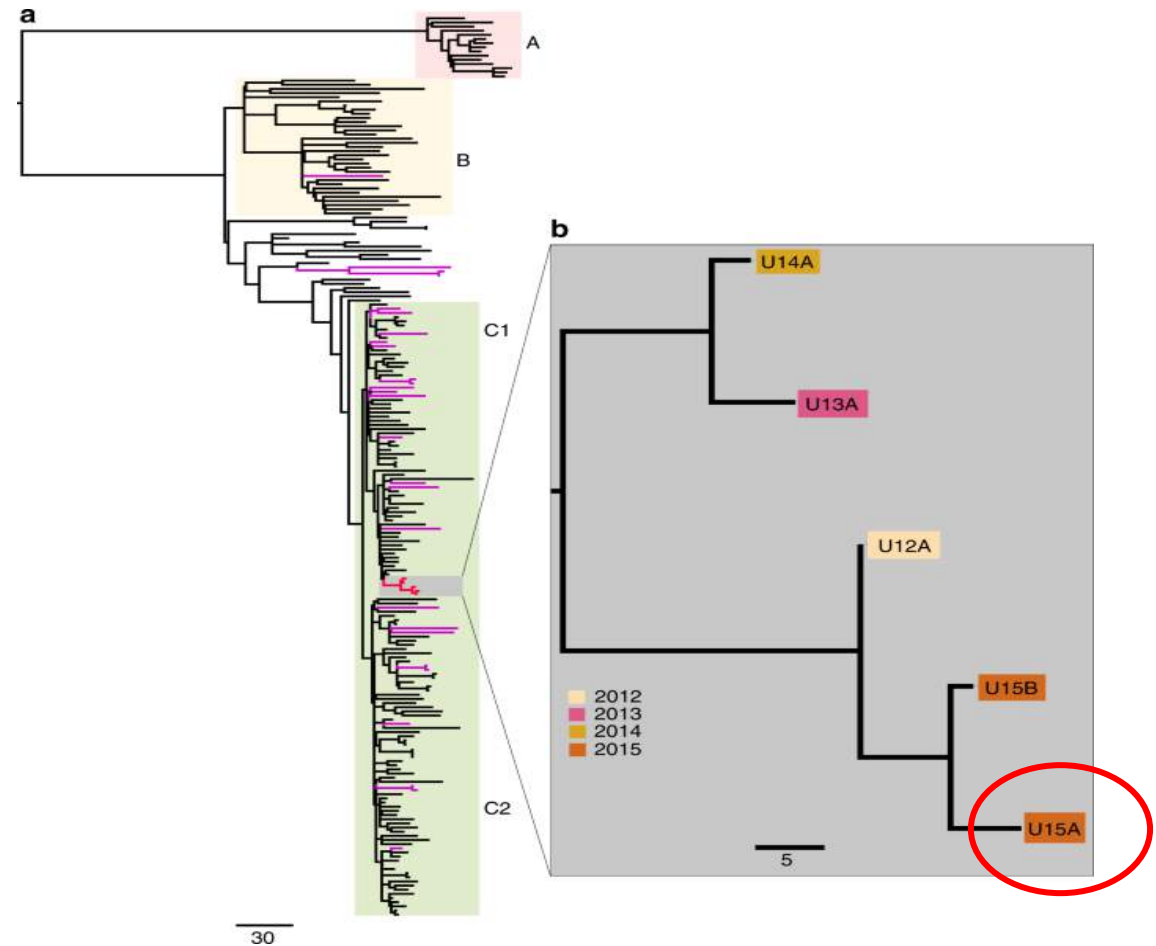
Previous work from Mulvey Lab

Since elderly female patient with rUTI
since 1970s

Sequencing in 2012 → ST131 that
persists regardless of treatment

5 strains isolated from patient over 4
year period, all highly related

Both antibiotic resistant and sensitive
strains co-exist in the patient,
suggesting 'load management' and
sharing the burden of AMR plasmids



Forde, B. M., Roberts, L. W., Phan, M. D., Peters, K. M., Fleming, B. A., Russell, C. W., ... & Beatson, S. A. (2019). Population dynamics of an *Escherichia coli* ST131 lineage during recurrent urinary tract infection. *Nature communications*, 10(1), 1-10.

Role of biofilms?

- Known to offer protection from antibiotics and facilitate HGT
- Consortium of attached bacteria encased in extracellular polymeric substances
- Biofilm growth is a natural state for gut microbiota
- Limited research suggests ST131 produces robust biofilms

Study design

- Characterize ST131 strain U15A further through competition assays
- Develop fluorescence toolkit – GFP into U15A plasmid
 - U15A electrocompetent, transform pkm208, develop/order primers, amplify GFP off plasmid, U15A_pkm208 electrocompetent, transform GFP into U15A (*)
- U15A biofilms with and without CFT073

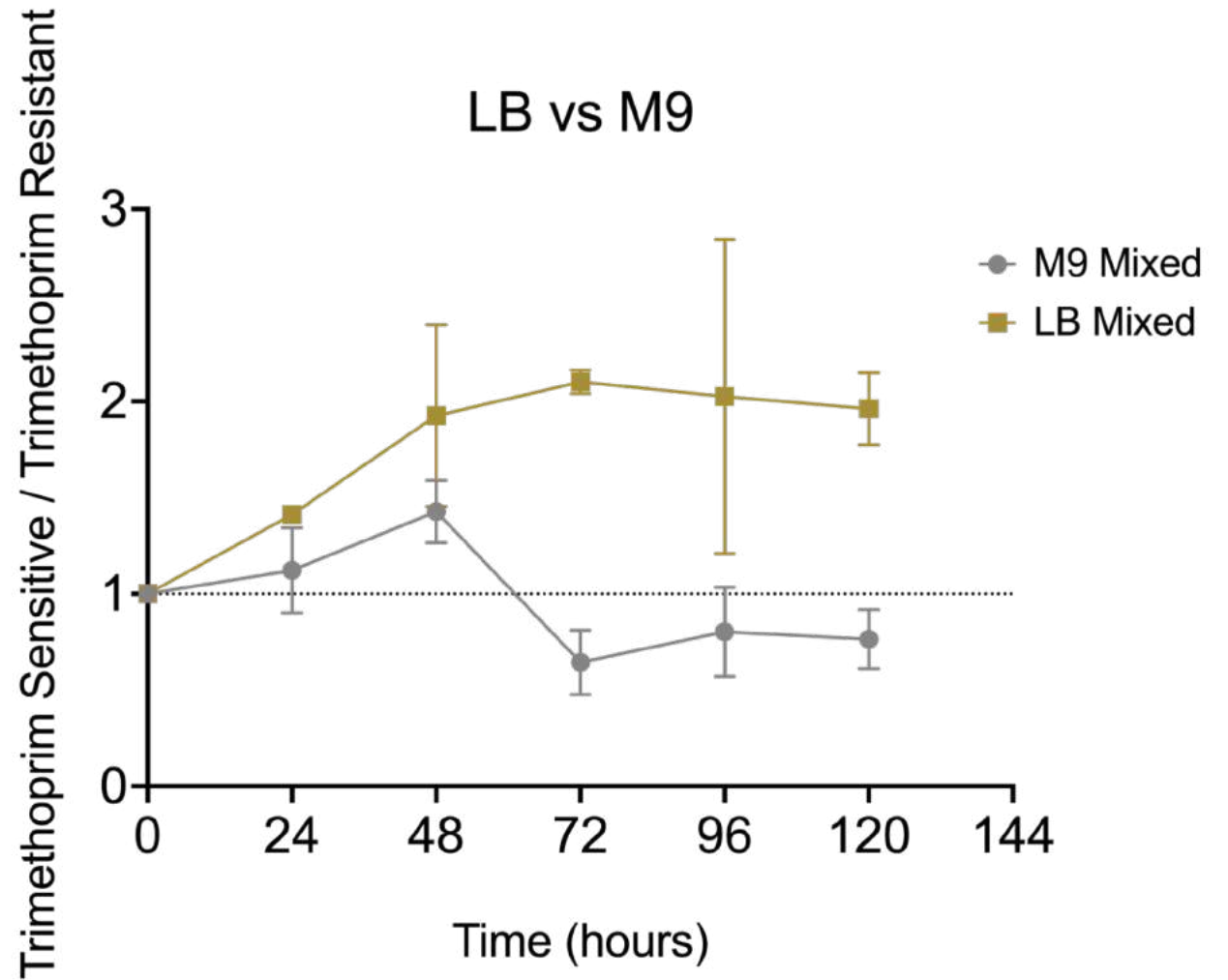
U15A Retains its Plasmid

Competition assay between U15A and ST131 strain that does not carry the AMR island

Sensitive strain clearly outcompetes U15A in LB

U15A appears to outcompete sensitive strain in M9

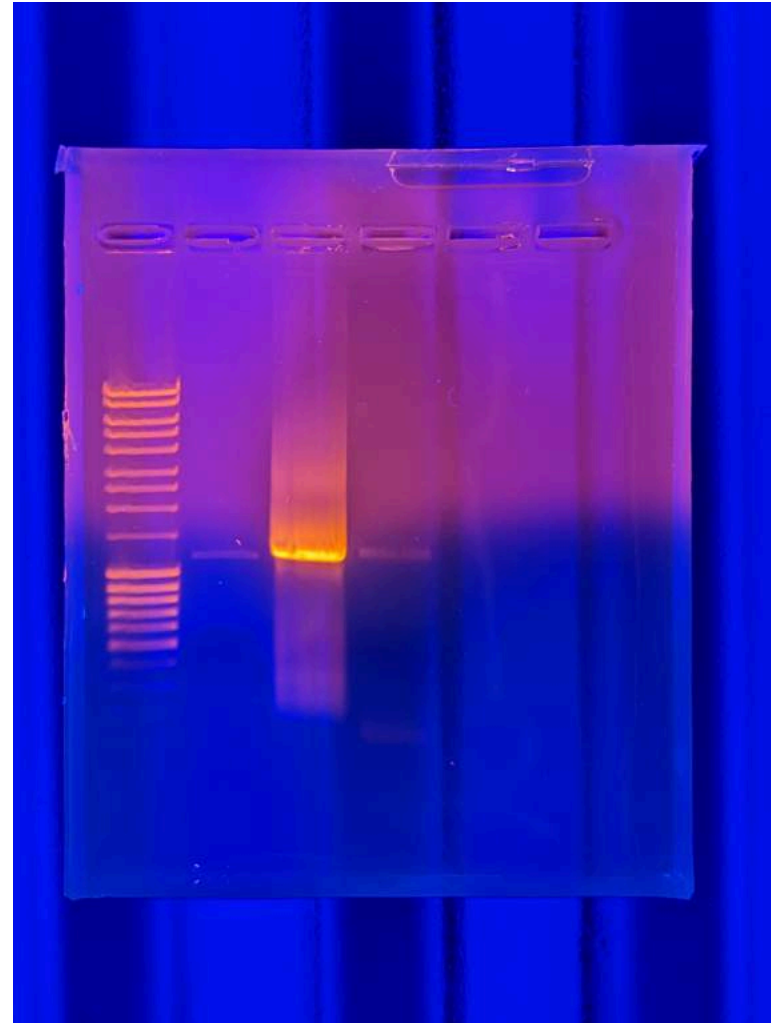
Further statistical tests needed

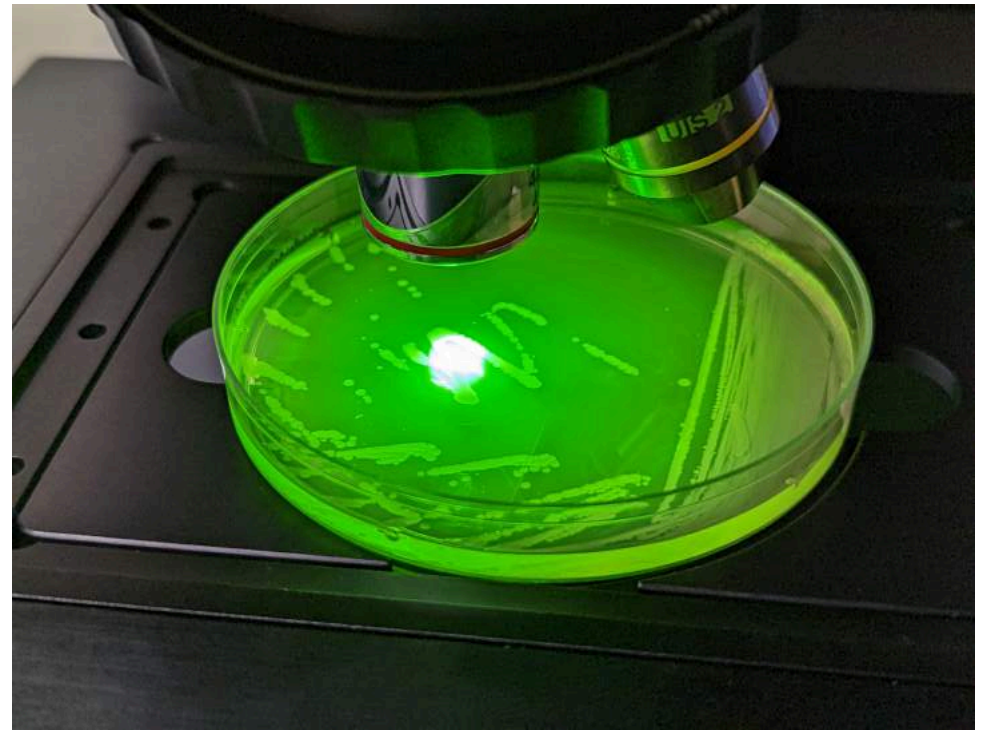
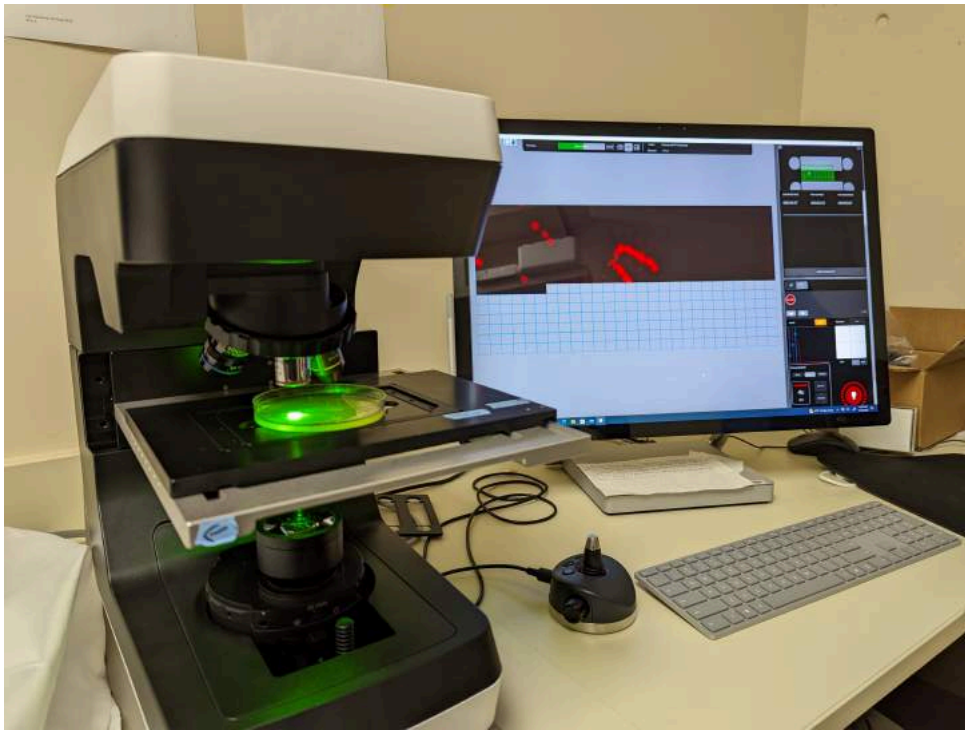


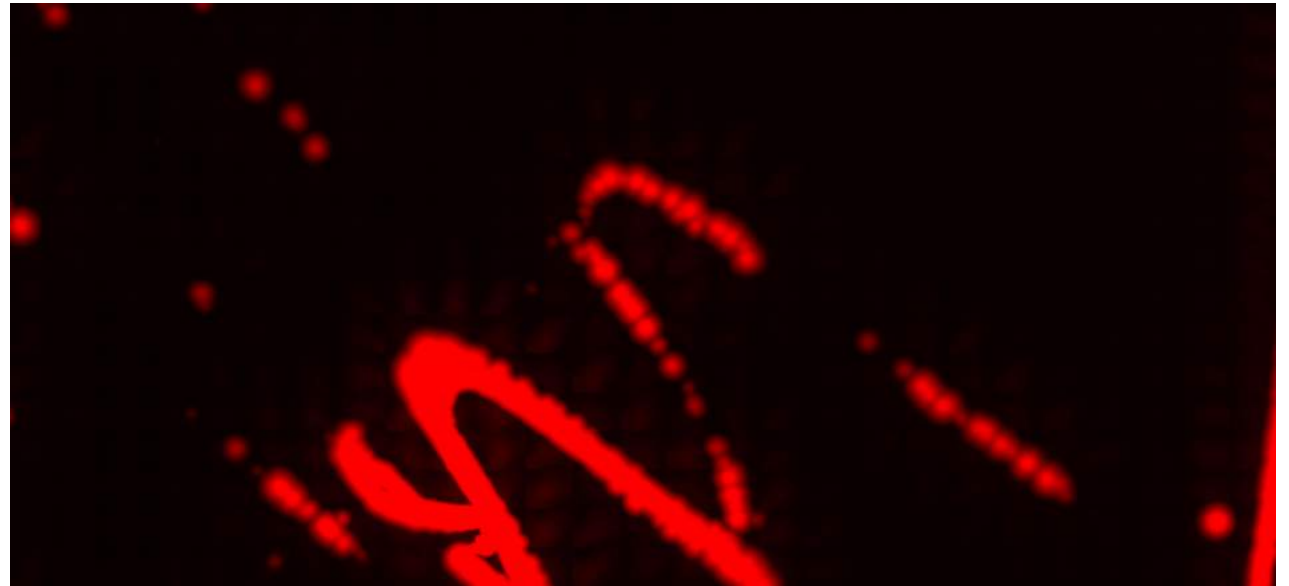
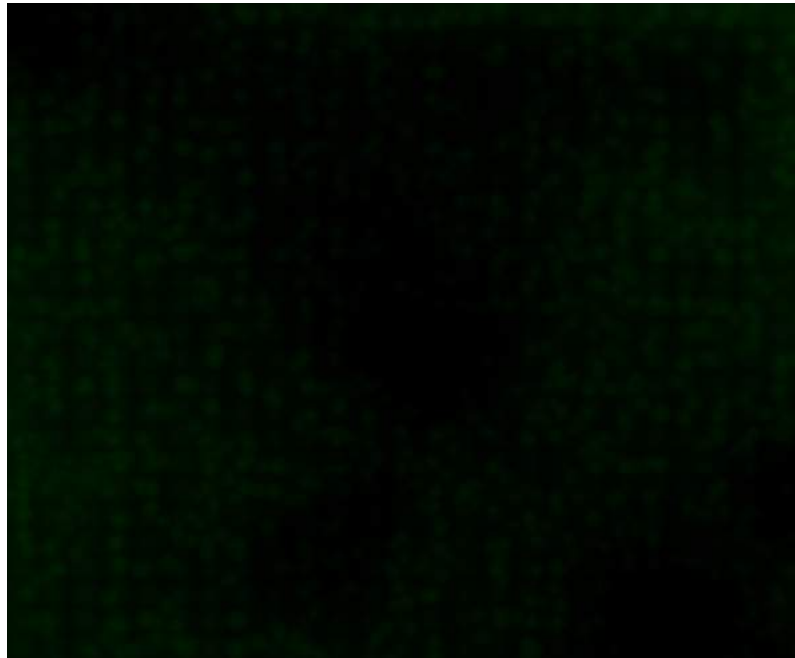
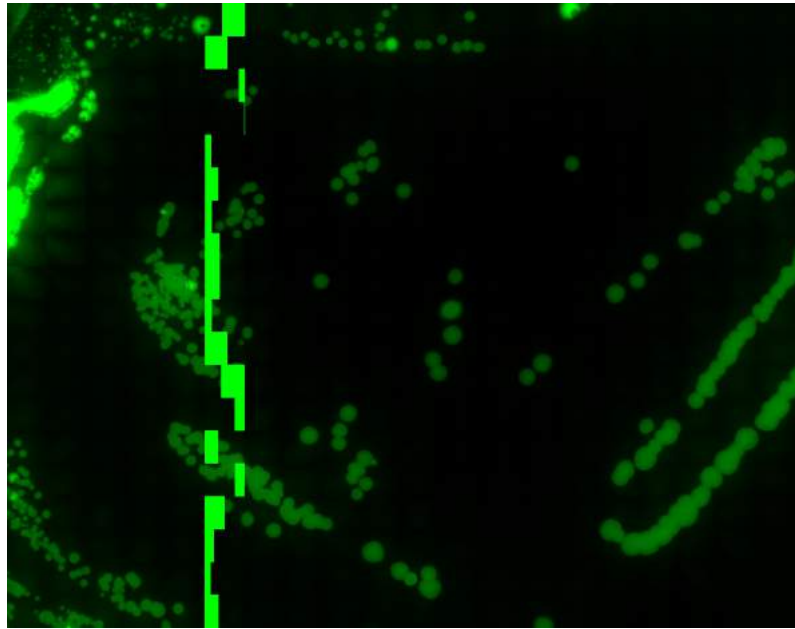
GFP into U15A Plasmid

First try unsuccessful

Gel from after amplification of GFP gene
from donor plasmid through PCR







Biofilms Branch Out

CFT073 (Uropathogenic ExPEC)

