- Announcements
- Pre-lab Lecture
  - Mod3 Concepts
  - Intro to M13 virus
  - Intro to nanowires
  - Today in Lab, FNT

Announcements

- Introducing… Bridget, TA for Module 3

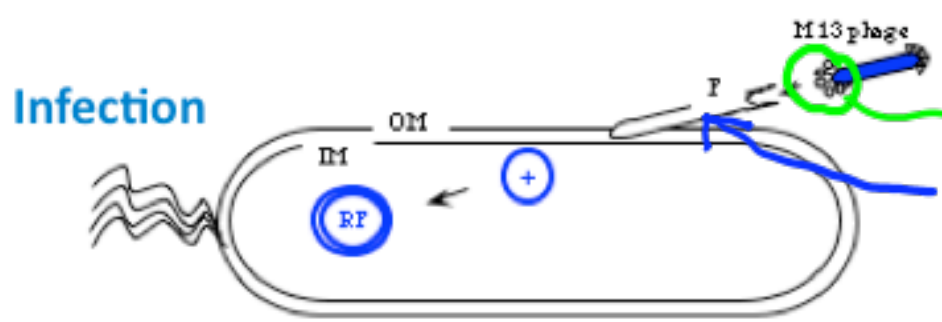
- Module 3 assessment: team oral presentation
  - Novel research proposal

- Heat problem:(Grab a lab coat if needed.

Module 3 Foundations

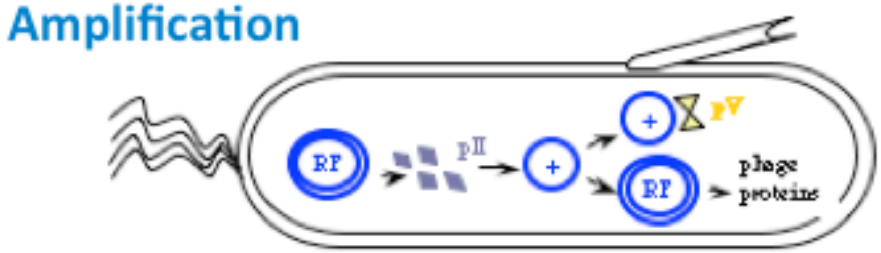
- Biology can interface with nano- and microscale materials
  cells 1-10 μM
  * viruses 0.01-1 μM
  proteins 1-100 nM
- Nanoscale materials may have improved or even emergent properties
  elec., magnetic, catalytic, optical
  high ratio surface area:volume
  * benefit + risks *
- Our nanomaterial is a phage!

M13 Phage "Life" Cycle

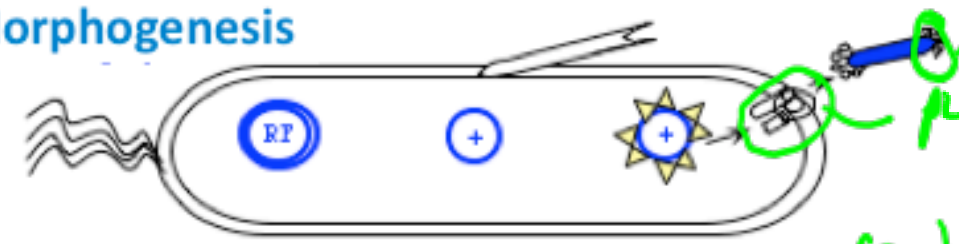


p3/p6 entry

F pilus w/TolA protein (E. coli)
interacts w/p3 (on Ø)



p2, p5, p10 → replicates in d.s. form
(packaged as s.s. form)



p7, p8 exit
p4, p1, p11 to make pore

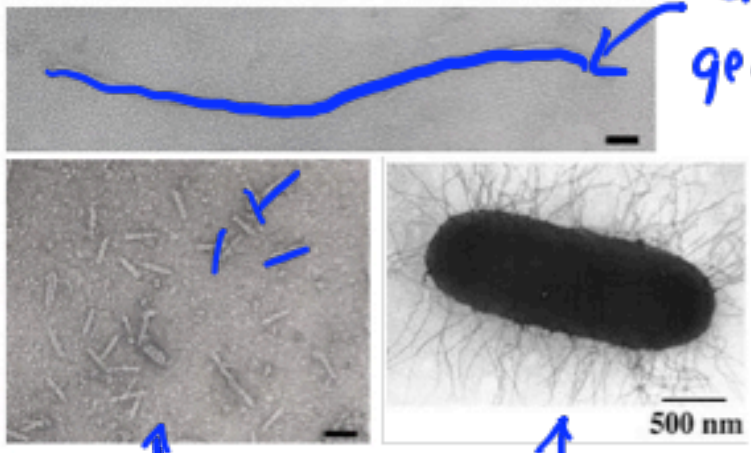
coated w/ p8

Image from Fall 2007 wiki. RF = replicating form

M13 as Engineering Substrate

Length of DNA (to be packaged) dictates size of phage… w/in limits

Surface proteins can be used for peptide display



p3 pros/cons?

Cons: low copy #

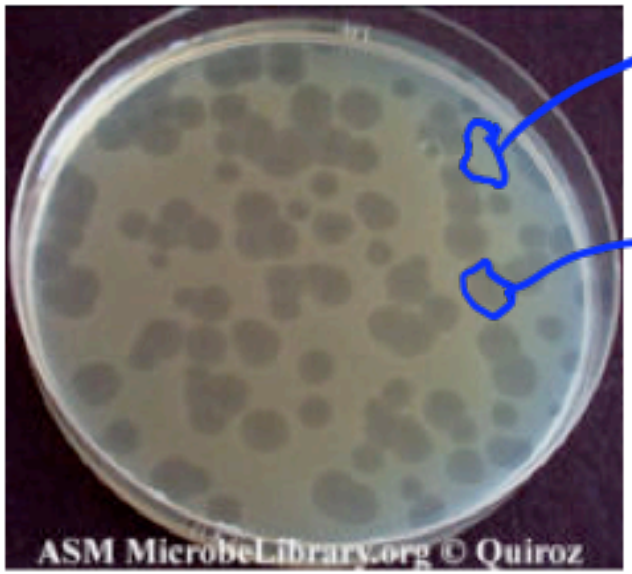
pros: directional

Can display longer peptides

We'll use p8 modified

Images from 20.109 wiki

Plaque assay



"lawn" - opaque = bacteria

"plaque" - clear = bacteria less dense ∴ infected w/ ∅

Phage slow *E. coli* growth upon infection

Quantify: PFU plaque-forming-units

cf. transformation

Serial dilution of ∅, + E. coli → top agar → pour plate

Gold Nanowire Synthesis

- Begin today: prepare solutions
  - CTAB : surfactant – stops rxn., puts viruses in line
  - Au, Ag, Vit C, NaCl → reducing agent
- Next time react Au/Ag with 8#9 phage
  - How selected? panning
  - Why bother? Li ions can move faster
- Eventually…
  - TEM observation
  - Battery assembly

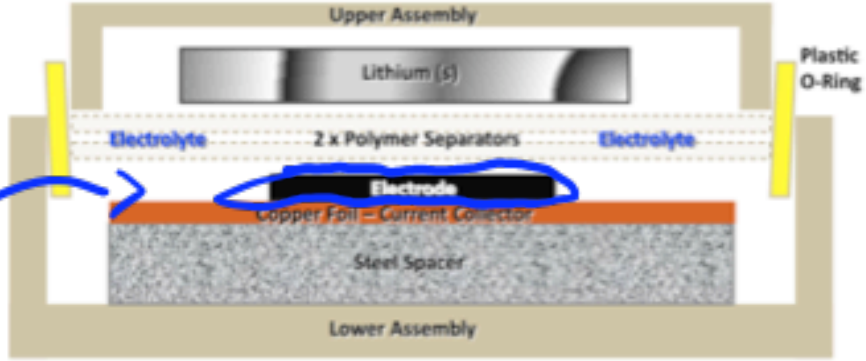


Image from J. Burpo

Today in Lab

- Prepare phage by precipitation with PEG/NaCl
  - Phage are in the supernatant!!
  - Pellet is bacteria (some ø)
- Make stock solutions for nanowire synthesis
  - Wear lab coat, gloves, safety glasses!!
- Obtain viral titer
  - Save remaining phage!!

- FNT = begin thinking about Mod 3 proposal

centrifugation → Niles lab

1 hr.