1. What is uropathogenic E. coli
   1. UPEC causes disease and is an excellent model organism for the study of opportunistic pathogens
   2. What is a UTI and how is it defined?
      1. Symptoms of UTI?
      2. Incidence of UTI
      3. What is recurrent UTI?
      4. What bacteria are able to invade bladders and what bacteria cause disease
      5. Asymptomatic bacteria are also capable of existing in the bladder
   3. How is UPEC cleared from the host
      1. Natural clearance
      2. Antibiotic therapy
2. What is the population structure of UPEC
   1. Population structure of E. coli in general
   2. Global pop structure of UPEC and E. coli
   3. Transmission of UPEC
   4. Within host population structure of UPEC
3. Current theories on UPEC population dynamics
4. Questions that remain in the host
   1. What strains cause recurrent UTI? Is it the same strain?
   2. Where do these strains come from?
   3. Does the gut act as a reservoir for UPEC?
   4. Does the population structure of UPEC change during recurrent UTI?
   5. How much recombination is involved in uropathogenesis and intra-host evolution?
      1. Note the 100 times greater chance of SNP change due to recombination than mutation from 2010 commensal E. coli paper
5. What studies of these questions will reveal
6. Experimental plan