Phase variation

- Virulence factor of Streptococcus pneumoniae
- Expression of different genes to adapt to different niches
- Opaque phase or transparent phase
- Appearance of the colony on a streak plate
- Opaque phase
    - High systemic virulence
    - Increased capsule
        - Enhanced protection against phagocytosis
    - Increased expression of PspA
    - Favour a stressful environment for protection
        - Blood
        - High macrophage area
- Transparent phase
    - Colonisation is favoured
    - Nasopharyngeal region
    - Capsule is decreased to allow exposure of adhesions
    - Increased expression of CbpA and LytA

Pseudomonas Aeruginosa

- Abundant opportunistic pathogen
- Pathogenic in hospital and immunocompromised patients
- Cystic Fibrosis predisposes human to bacteria
    - Autosomal recessive genetic disease
    - Affects predominantly the lungs but also gut and liver
    - In lungs, Cystic Fibrosis transmembrane conductance regulator encodes a chloride channel
    - CFTR is dysfunctional in CF (Loss of function)
        - Cannot secrete chloride ions
        - Overexpression of ENac
        - High amounts of sodium and water reabsorption
    - Accumulation of very thick mucus
        - Weak mucosal clearance
        - Matted down cilia
    - Favourable medium for bacteria
- P aeruginosa has varied phenotypes when in CF lungs
    - Mucoidy phenotype
        - Alginate production
        - Contributes to persistence in lungs
        - Aids in biofilm formation and adherence preventing lung expulsion
        - Highly resistance to antibiotics and neutrophil killing
    - MucA
        - Inner membrane bound anti sigma factor
        - Sigma factor AlgT(U) transcribes genes to increase alginate production
        - Repress fliC expression

        - No flagella
- Efflux pumps
    - RND family transporters
    - Proton/substrate antiporters
    - ArcB/MexB
        - Specific for certain drugs