HAEMOPHILUS & BORDETELLA

- Gram Negative, pleomorphic forms, non-motile, non-spore forming
- Require enriched media for growth -
- ***H. influenzae*** type b is an important human pathogen. causing upper respiratory tract infection, meningitis in children
- ***H. duceryi*** a sexually transmitted human pathogen. -
- ***Bordetella pertussis*** causing whooping cough-
- other haemophilus species are among normal flora -

Morphology & Identification

- Coccoid-bacilli shape occuring in pairs or short chain can be isolated from acute infection & rich medium 6-8 hrs old.
- Longer , liced bacteria &/or poleomrphic shape can be isolated from 6-18 hrs old culture which have a definite capsule.
- Capsule is the antigen used for typing; type b is consist of polyribose-ribitol phosphare (PRP)

CULTURE OF *H. influenzae*

- On Choclate agar: flat , grayish-brown colonies with 1-2 mm can be seen after 24 hrs of incubation.
- Growth can be enhanced by addition of Iso VitaleX in media
- *H. influenzae* does not grow on sheep blood agar except around staphylococci colonies.

GROWTH CHARACTERS

- Identification of ***H. influenzae*** depends in part upon: 1) the needs for the growth factors V & X. Factor V can be replaced by Nicotine amide Adenine Di nucleotide (NAD) & Factor X acts physiologically as haemin. 2) Capsule existence or absence.* TRANSFORMATION which occusionally leads to transfer DNA from one species to another. Am & Chloramph. Resistnace is control by genes on transmissible plasmid.

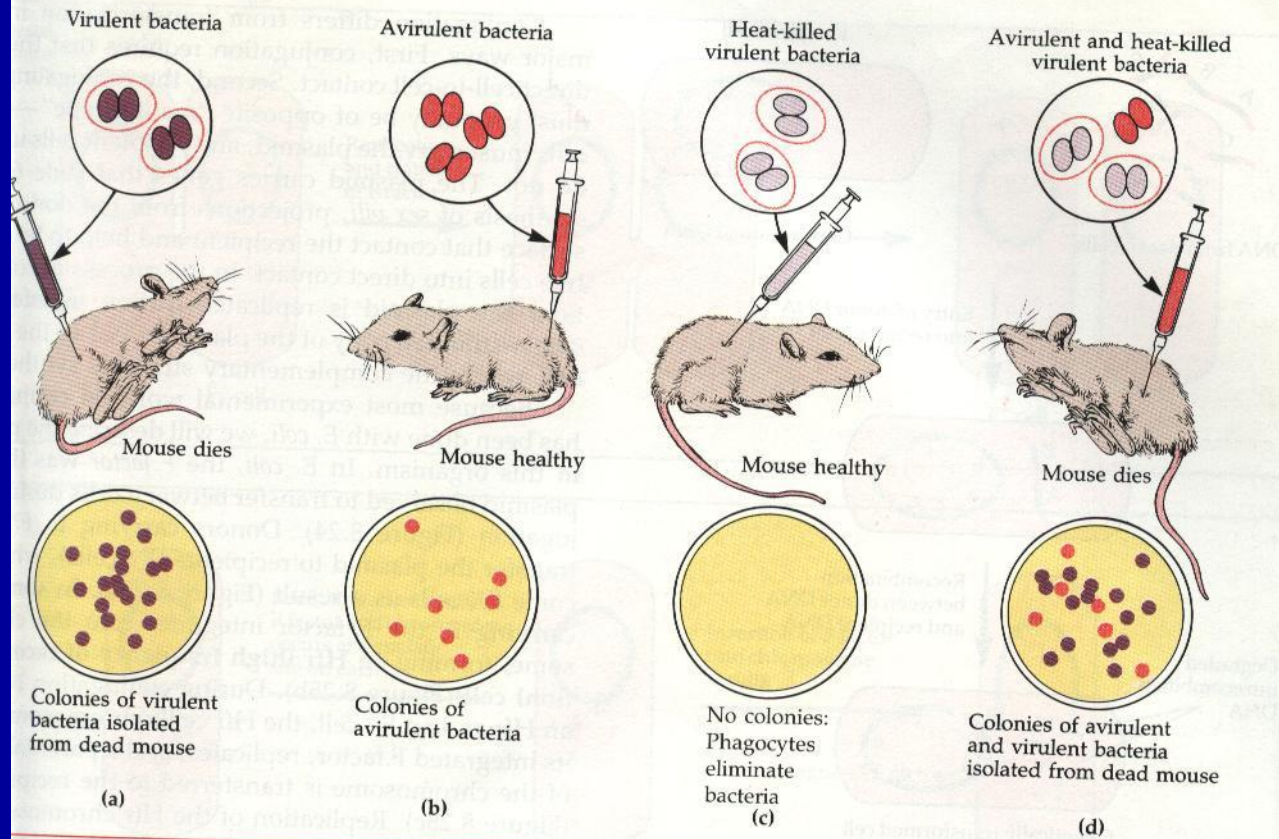


FIGURE 8.22 Transformation. Griffith's experiment demonstrating genetic transformation. Some material from the heat-killed virulent bacteria transformed the living avirulent bacteria into virulent bacteria, which killed the mouse. Avirulent bacteria lack capsules and are readily destroyed by the host; therefore, few show up as colonies on the medium in (b) and (d).

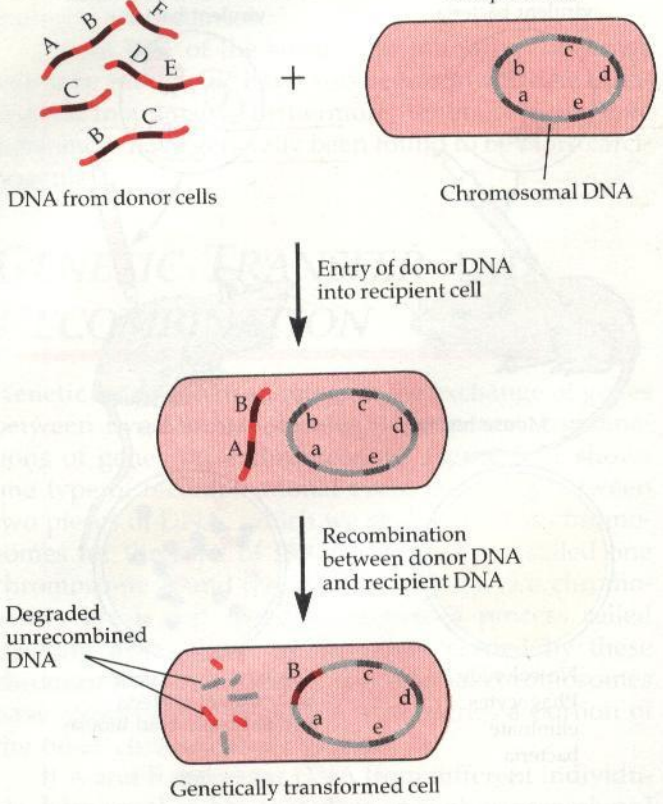


FIGURE 8.23 Mechanism of genetic transformation.

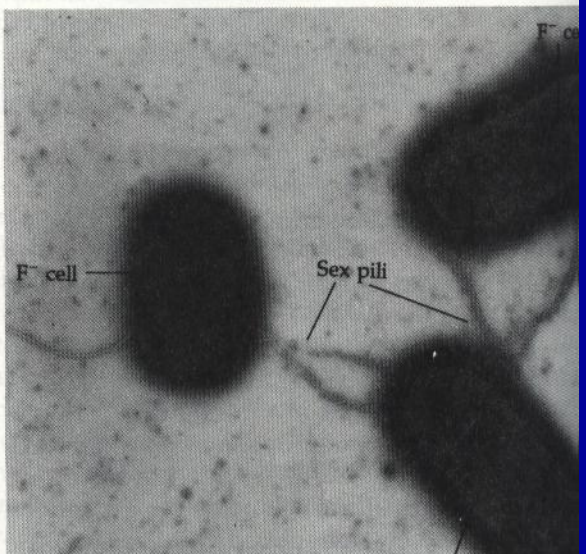
ferred to the recipient, it is still a very large molecule that must pass through the recipient cell wall and membrane. When a recipient cell is in a physiological state in which it can take up the donor DNA, it is said to be **competent**. Competence may be related to alterations in the cell wall that make it permeable to the large DNA molecule.

The well-understood and widely used bacterium *E. coli* is not naturally competent for transformation. However, a simple laboratory treatment enables *E. coli* to readily take up DNA. The discovery of this treatment has enabled *E. coli* to be used for genetic engineering, as will be discussed in Chapter 9.

Conjugation in Bacteria

major ways. First, conjugation requires that the direct cell-to-cell contact. Second, the conjugating must generally be of opposite "mating type"— cells must carry the plasmid, and recipient cells u do not. The plasmid carries genes that code f synthesis of *sex pili*, projections from the donor surface that contact the recipient and help to bri two cells into direct contact. In the process of co tion, the plasmid is replicated during transfe single-stranded copy of the plasmid DNA to the ent, where the complementary strand is synthe

Because most experimental work on conju has been done with *E. coli*, we will describe the p in this organism. In *E. coli*, the *F factor* was th plasmid observed to transfer between cells durin jugation (Figure 8.24). Donors carrying F (F^+ transfer the plasmid to recipients (F^- cells), whi come F^+ cells as a result (Figure 8.25a). In som carrying F, the F factor integrates into the ch some, forming an **Hfr (high frequency of recom tion) cell** (Figure 8.25b). During conjugation be an Hfr and an F^- cell, the Hfr cell's chromosome its integrated F factor, replicates, and a parental of the chromosome is transferred to the recipie (Figure 8.25c). Replication of the Hfr chromoso gins within the F factor, and a small piece of the



Pathogenesis

- Non-capsulated *H. influanzae* is part of the normal flora , produce no endotoxins or exotoxins. Its capsule is **antiphagocytic**

Polyribos phosphate(PRP) is the major viriolent factor.

- Type b causes also, meningitis pneumonia, epiglottitis, cellulitis & septic atrithritis.

- Non-typeable may cause ch bronchitis, otitis media, sinusitis & conjunctivitis following ***the breakdown of*** normal defense mechanism.

Clinical Findings

- *H. influanzae & pneucoccus inter through the RT. They are two of the most*
- *Common etiologic agents of bacterial otitis media.*
- *Before the use of conjugate vaccine, it was the most common cause of meningitis*
- *in children of 5 months to 5 years where*
- *Obstructive layngotracheitis with swollen cherry-red epiglottis may develops which require prompts of childen*

TREATMENT

- Mortality of untreated *H.influanze may reach 90%. Most strains are susceptable* •
Ampiccilin. However, about 25% are producing B- •
lactamase under the control
of a transmissible plasmids. •
- Cephalosporins is almost used w/o •
resistance. •
-Cefotaxime given intravenously with excellent results. •
- Late complecations of meningitis leading to •
accumolation of local fluid require surgical drainage.

Epidemiology & Prevention

- Respiratory route is the way of transmission.
- Type b disease can be prevented by administration of conjugate vaccine (CV) to children. CV can be prepared by :

a- mutantans of ***C. diphtheraie****(CRM197)* *toxins or b)* ***Neisseria meningitis*** *outer membrane complex.*

- By this procedure 95% of meningitis can be reduced in children.

BORDETELLAE

1- ***B. pertussis*** causes whooping cough •

2- *B.parapertussis* causes similar disease •

3- *B. bronchiseptica* causes diseases in animals. •

4- B. avium causes turkey coriza & not known to infect humans. •

BORDETELLA PERTUSSIS

- Is a capsulated minute gram negative coccobacilli similar to *H. influenzae. With touidine blue stain.*
- *Requires enriched media for growth* (potato-blood-glycerol agar)+ pencilline G 0.5ug/mL. Also charcoal media of *Legionella penumophila* is preferable. Moist environment is required for incubation for 3-7 days at 35-37 C.

Sugar Fermentation

- Glucose & lactose are fermented by • *B. pertussis at* strictly aerobic environment with production of acid but no gas. It does not required X & V.
- The virulent *B. pertussis* is showing heamolysis on blood agar at its virulent phase.

Clinical Diagnosis

- Catarrhal inflammation with mild coughing & sneezing appeared after 2 weeks of incubation period.
- Patient is highly infectious due to the large number of contaminated droplets.
- The cough develops its explosive character of “whoop upon inhalation” during the paroxysmal stage.
- The whoop occurs in infants & paroxysmal coughing occurs in older children & adults.

Clinical Diagnosis(Cont.)

- WBC count is high(16,000 – 30,000/uL
- Prolong coughing (4-6 weeks) in adult.
- These signs & symptoms may be confused with infections of adenovirus And/or Chlamydia pneumoniae.

LAB. DIAGNOSIS

1- Direct Test: Specimens of nasal pharyngeal swabs, saline nasal wash and droplets from coughing can be tested directly by fluorescent antibodies and/or culture . False - & false + are expected

- & The sensitivity of the test is about 50%.

2-Culture: growing colonies will be identified by Immunofluorescence staining

- Or by slide agglutination with specific Abs.

LAB. DIAGNOSIS(Cont.)

- 3- Polymerase Chain Reaction (PCR) is the most sensitive method of diagnosis.
- 4- Serological Test is not recommended
- Because a rise of agglutinating or precipitating antibodies does not occur until the third week of illness.

IMMUNITY

- Recovery or immunization helps in making the second infection is mild if occur but the re-infection may occur years later in adults will be sever. i.e. the antibodies may prevent attachment of ***B. pertussis*** to cillia of the respiratory epithelium.

TREATMENT & PREVENTION

1-Erythromycin during catarrhal stage •

2- Treatment after paroxysmal stage has •

a very little effect. •

3-Oxygen inhalation & sedation may • prevent anoxic damage to the brain.

QUIZ

How you cure & prevent the spreading of the following diseases:

1- Leptosirosis
   a- treatment:
   b- prevention
2- Lyme disease
a- traetment
B- prevention
3- Meningitis caused by *H. influanzae*
A- treatment
b- prevention