CONCEPT: BACTERIAL CONJUGATION

● **Conjugation** is the physical union of bacterial cells to exchange genetic material

□ _____ in 1946 by Lederbergand and Tatum

- They had two different *E. coli* strains: A and B

- A only grows in medium with methionine and biotin

- B only grows in medium with threonine, leucine, and thiamine

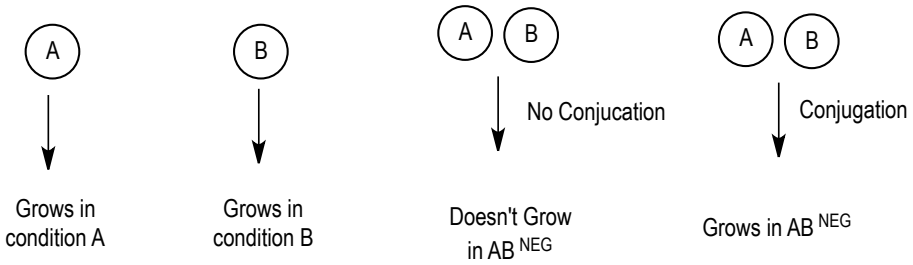
- The two strains were mixed, and plated on a surface where neither would grow

- But, some grew – meaning that DNA exchange had occurred between the two strains

□ The **Sex pili (F pili)** is the name of the structure that allows for conjucation

- The **conjugation bridge** is the passageway for DNA transfer

EXAMPLE:



F Factor

● The **F (fertility) factor** is a factor that confers the ability to swap DNA between bacteria

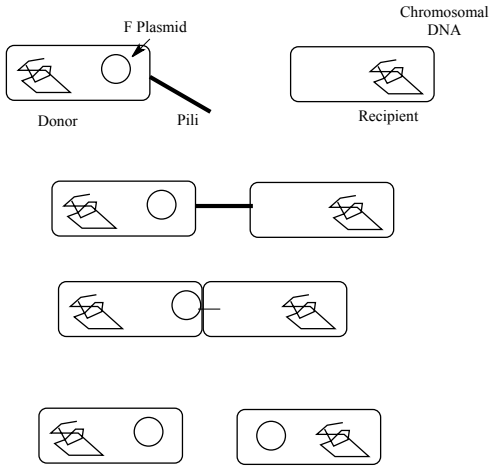
□ Bacteria with the F factor (**F^+**) can _____ genetic material, while bacteria without it (**F^-**) accept genetic material

- The F factor, in this case, is a plasmid

- The F^+ factor can be given to the F^- cell during conjugation

- These recombinants form through conjugation, and not genetic recombination

EXAMPLE:



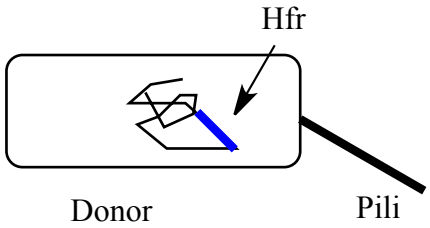
□ **Hfr (High frequency of recombination)** bacteria have the F factor integrated into the chromosome (not plasmid)

- The F factor, in this case, is a _____ gene in the chromosome

- The F^+ cannot be given to the F^- cell during conjugation

  - However, there are many more recombinants made by Hfr, but these occur via recombination

EXAMPLE:



□ **Hfr** bacteria can be used to _____ bacterial chromosomes

- You incubate Hfr cells with F^- bacterial cells (Hfr x F^-)

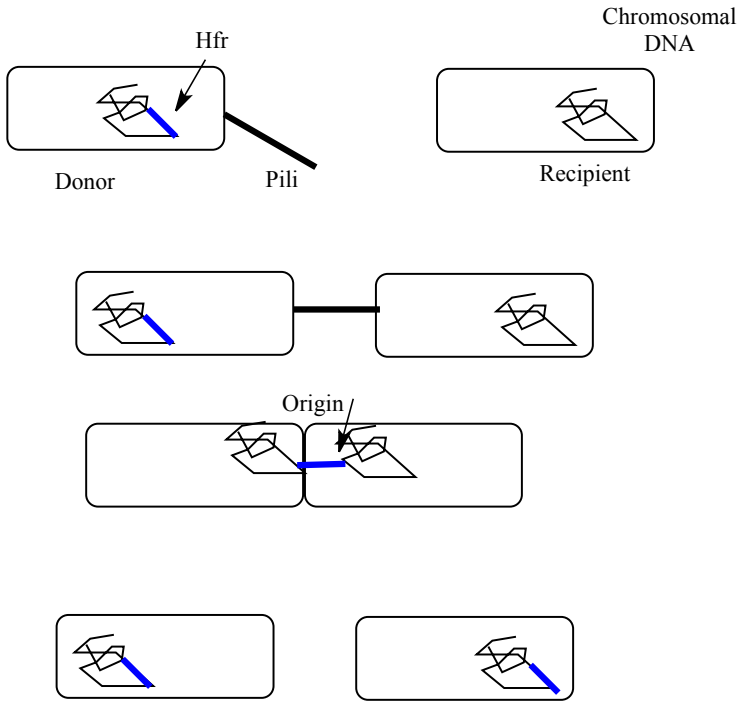
- The Hfr stimulates bacterial conjucation

  - The **Origin** is the area where the gene first transfers to the other cell

- You stop conjugation via **interrupted mating** where you use some kind of force to break the connection

- Genes close to Hfr, will have recombined before mating was interrupted. Genes far away, wont have.

EXAMPLE:



Other Plasmids

□ Bacteria contain other _____ in addition to the F factor

- **R plasmid** carries on it the genes that confer *antibiotic resistance*

- These plasmids can be transferred between bacterial species

- Often these contain a *transposon* (jumping gene) which assists in DNA transfer

PRACTICE

1. True or False: For conjugation to occur, bacterial cells must physically contact each other.
    a. True
    b. False

2. What is the name of the structure through which DNA is transferred?
    a. DNA bridge
    b. Sex Pili
    c. Genetic Material Passageway
    d. Fertility Factor

3. What property does the F factor give bacteria?
    a. Antibiotic resistance
    b. The ability to swap DNA via conjugation
    c. The inability to swap DNA via conjugation
    d. The ability to integrate the DNA into the chromosome

4. A F^+ bacterial cell can donate DNA to which type of bacterium?
    a. An F^+ bacteria
    b. An F^- Bacteria
    c. An Hfr Bacteria
    d. An R^+ bacteria