



Ref. No.:

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CORE CONCEPT OF
Microbiology

MULTIPLICATION OF BACTERIA

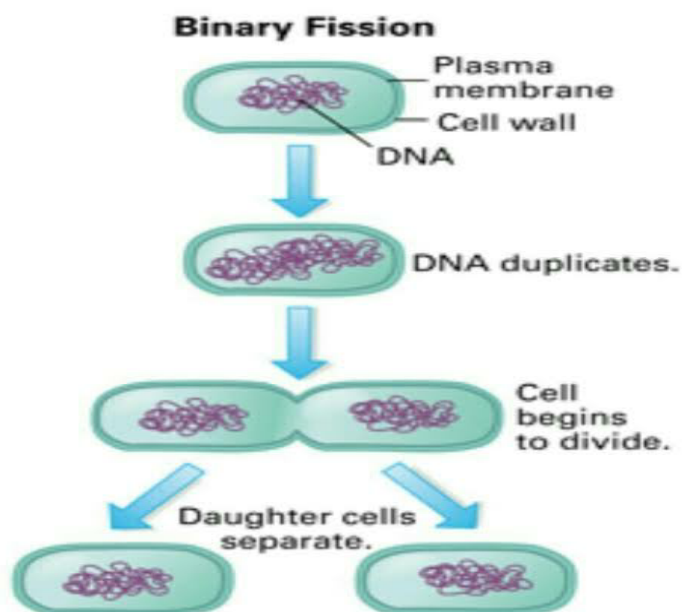
As a rule bacteria reproduce very rapidly. The common method of reproduction in bacteria is by the process of **cell-division**, commonly known as **fission**, **binary fission** or **simple fission**, in which a bacterium simply divides into two new one-celled bacteria.

Bacteria multiply or reproduce by different methods :

1. **ASEXUAL REPRODUCTION** - It takes place by binary fission and sporulation.

(A) **BINARY FISSION** - Nucleus divides amitotically and the process of binary fission is completed in 20 to 25 minutes.

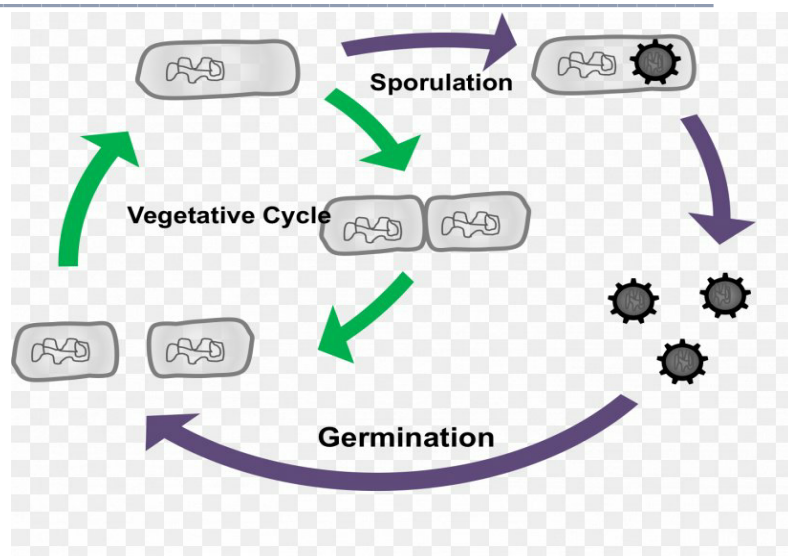
(B) **SPORULATION** - This takes place by the formation of conidia and endospores. Conidia are produced in chain at the tips of branches of filamentous streptomyces. Endospores are sessile and single celled bodies formed in the Bacillus forms. The Endospore germinates to form a new bacterium.



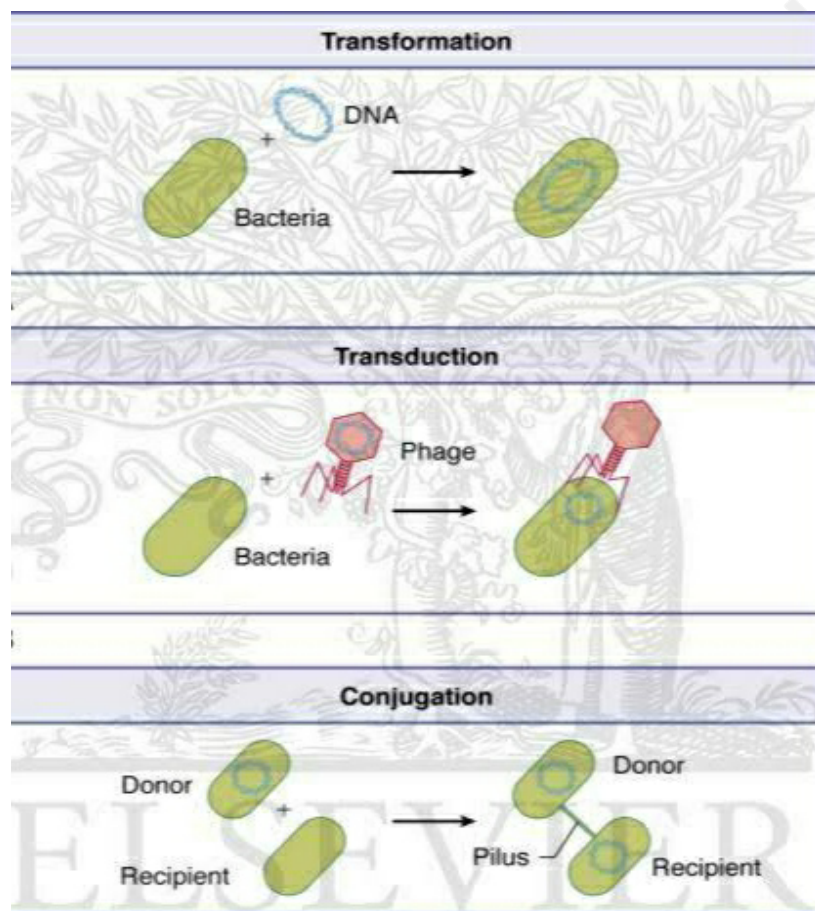


2. SEXUAL REPRODUCTION - It occurs by following methods :

(A) TRANSFORMATION - Although it was first reported by Griffith (1928); it's mechanism was really discovered in 1944 by Avery, MeLeod and McCarty in pneumococcus pneumoniae. In this bacterium the virulent (disease causing) strain is capsulated, whereas the avirulent strain (non-infective) is non-capsulated.



The virulent strain on injection killed the mice (septicemic) while avirulent did not. However, the heat-killed virulent strain failed to kill the mice but when living avirulent strain and heat-killed virulent strains were mixed and injected, some mice died. Later on it was identified that it was actually the DNA of capsulated bacterium which transformed the avirulent strain (non-capsulated) into the virulent (capsulated) ones. This otherwise proved that the DNA is the genetic material of pneumococci.



(B) TRANSDUCTION - It is the process of transfer of DNA segment from one bacterium to the other (like conjugation) but always mediated by a virus. The process is reported by Lederberg and Zinder (1951). No conjugation tube is formed.



(C) CONJUGATION - In E.Coli transfer of F-factor from the donor bacterium(F⁺ or male) to the recipient (F⁻ or female) through a conjugation tube (formed by sex pili) was reported by Lederberg and Tatum (1946). Following this transfer, F⁻ bacterium was changed into F⁺.

The original genome of the recipient cell is called " endogenote " and the fragment of DNA transferred from the donor cell is called " exogenote ". The recipient cell being only partially diploid is called " mesozygote " (not true zygote). When F-factor becomes incorporated in the bacterial genome, such males are called Hfr males. However the conversion of F⁻ bacterium into F⁺ following the infection by episome DNA provides another evidence that DNA is the genetic material.

(D) SEXDUCTION - The Hfr males may revert back to the normal F⁺ males by normal separation of F-factors, as observed by Jacob and Adelberg (1959). During separation of F-factor from bacterial genome, the former may carry some of the bacterial genes due to faulty separation called sexduction. The resultant males are called F' (prime males).

