

Microbial Genetics

Structure and Function of the Genetic Material :

1- Genetics is the study of what genes are, how they carry information, how their information is expressed, and how they are replicated and passed to subsequent generations or other organisms.

2- DNA in cells exists as a double-stranded helix; the two strands are held together by hydrogen bonds between specific nitrogenous base pairs: AT and CG.

3- A gene is a segment of DNA, a sequence of nucleotides, that codes for a functional product, usually a protein.

4- The DNA in a cell is duplicated before the cell divides, so each daughter cell receives the same genetic information.

Genotype and Phenotype:

5- Genotype is the genetic composition of an organism, its entire complement of DNA.

6- Phenotype is the expression of the genes: the proteins of the cell and the properties they confer on the organism.

DNA and Chromosomes:

7- The DNA in a chromosome exists as one long double helix associated with various proteins that regulate genetic activity.

8- Bacterial DNA is circular; the chromosome of E. coli, for example, contains about 4 million base pairs and is approximately 1000 times longer than the cell.

9- Genomics is the molecular characterization of genomes.

The Flow of Genetic Information :

10- Information contained in the DNA is transcribed into RNA and translated into proteins.

DNA Replication:

11- During DNA replication, the two strands of the double helix separate at the replication fork, and each strand is used as a template by DNA polymerases to synthesize two new strands of DNA according to the rules of nitrogenous base pairing.

12- The result of DNA replication is two new strands of DNA, each having a base sequence complementary to one of the original strands.

13- Because each double-stranded DNA molecule contains one original and one new strand, the replication process is called semiconservative.

14- DNA is synthesized in one direction designated 5' - 3'. At the replication fork, the leading strand is synthesized continuously and the lagging strand discontinuously.

15- DNA polymerase proofreads new molecules of DNA and removes mismatched bases before continuing DNA synthesis.

16- Each daughter bacterium receives a chromosome that is virtually identical to the parent's.

References': 1- Microbiology an introduction TWELFTH
.EDITION. Gerard. Tortora.2016

Microbiology an introduction TENTH EDITION. Gerard. -2
.Tortora.2010