DNA, Genes and Cell Division

Gregor Mendel
1822-1884

What caused wrinkled phenotypes of peas in Mendel's experiments?
Watson & Crick Model of DNA (1962)

1. DNA consists of double helix
2. The base-pairs are adenine to thymine and cytosine to guanine
3. Base-pairs may be in any sequence

DNA makes RNA makes Protein

1. Messenger RNA: Actual message coded by DNA that directs protein synthesis.
2. Transfer RNA: Binds to amino acids and brings them to a ribosome
3. Ribosomal RNA: Structural component of ribosomes

Ribosomes Play a Central Role in Protein Synthesis
1. Universal
2. Continuous
3. Degenerate

Translate this fragment of DNA using the genetic code table

5'-TTTGTACTGTTATGTTGTTGCGAGCCTGTCCCGACCTTCGTTTTAAACATCATTACGGGTAGTTCTTACAGGGGTCA -3'
Plant Genetic Engineering

Transgenic: contain genes from other organisms

- Blue rose: genes from petunia that controls the synthesis of blue floral pigment
- Insect resistant plants: Bacillus thuringiensis
- Never ripe tomatoes:
  - Vaccine production in transgenic plants

Arabidopsis: A Model System

1. Small and easy to grow.
2. Small generation time
3. Smallest known genome of any flowering plant (30,000 genes with only 5 pairs of chromosome)

Arabidopsis thaliana (belongs to the mustard family)

How do plants grow and divide

- Zygote: forms by fusion of sperm and an egg
- Zygote grown into embryo which has specialized regions called meristems

PLANT CELLS ARE TOTIPOTENT
Mitosis: prophase, metaphase, anaphase, and interphase in *Allium* root tip cells (meristematic cells)
Stages of mitosis in *Allium* root tip cells

- Interphase
- Prophase
- Metaphase
- Early Anaphase
- Late Anaphase
- Telophase