DNA transforms Bacteria

Frederick Griffith studied two strains of pneumonia	pathogenic and nonpathogenic
heat-killed pathogenic + nonpathogenic bacteria	= pathogenic bacteria (live disease-causing)
transformation	change in genotype and phenotype due to assimilation of external DNA by a cell

scientists studied to find the genetic material of chromosomes - protein vs. DNA

DNA transforms Bacteria (cont.)

Oswald Avery also proved that DNA was the molecule that transformed bacteria

Viruses

DNA or RNA in a protein coat	infect by taking over a cell's metabolic machinery
Bacteriophages	viruses that infect bacteria

Henry and Chase showed that DNA was the genetic material that infected the bacteria

Used radioactive isotope markers to label DNA and proteins of phages. Phage DNA entered the bacteria cell, but protein did not.

Chargaff's Rule

concentration of … [A] = [T] [C] = [G]

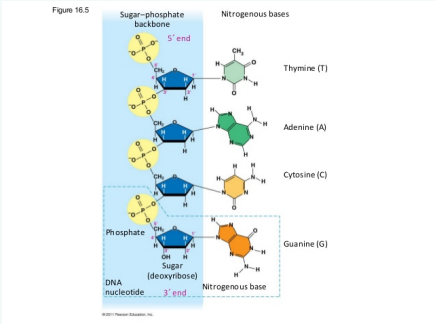
Rosalind Franklin

x-ray crystallography	image of DNA produced by x-rays diffracting when passing through DNA fibers

DNA is a double helix, with two anti-parallel sugar-phosphate backbones, and nitrogenous bases in the molecule's interior

anti-parallel - subunits run in opposite directions

DNA is a polymer of nucleotides



components: nitrogenous base, deoxyribose sugar, phosphate group
bases: adenine, guanine, thymine, cytosine

Structure of DNA

DNA is a polymer of *nucleotides* connected by **covalent bonds**

4 nitrogenous bases:	Purines (double ring) [A] [G]	Pyrimidines (single ring) - [C] [T]
DNA base pairing	PURINE always pairs with PYRIMIDINE	2 of the same would be too wide/narrow

3 *hydrogen bonds* between C and G

2 *hydrogen bonds* between A and T

DNA Replication

S phase of Interphase

DNA made from existing DNA strand

semiconservative model	one parent strand serves as a template to a complementary strand
	half of parent strand is conserved in each *daughter strand*

- Meselson and Stahl

DNA Replication (cont.)

origins of replication	where replication of DNA molecule begins
bacterial chromosome	circular, *single* origin
eukaryotic chromosome	linear, *thousands* of origins
replication fork	Y-shaped region formed by unwinding of parent strands

- reference drawings to understanding rest of replication -

Proofreading DNA

DNA polymerase	proofreads each nucleotide as it's covalently bonded
mismatch repair	other enzymes remove and repair incorrect nucleotides

Proofreading DNA (cont)

nucleotide excision repair	mutated strand is cut out by enzyme **nuclease**, and the gap is filled with DNA polymerase and ligase

- seen in skin cells when correcting thymine dimmers cause by UV rays

Evolution Significance of DNA Nucleotides

Mutations occur when uncorrected mismatched nucleotides are replicated and passed onto a daughter cell. Usually harmful and permanent genetic changes that support natural selection.

Replication at Molecule Ends

- reference drawings -

Inside a Chromosome

eukaryotic cell	one long DNA double helix with large amnt. of protein =	**chromatin**

the long DNA fits in the nucleus through packing

- reference drawings -

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