Lecture 2

DNA

Chargaffs rule about A=T C=G

nucleotide triphosphate
its like a chain with the sugar base (ribose) with the nitrogen base

1′ position is the carbon on the ribose that connects to the nitrogen base then around to the other carbon is 5′

G is deoxyribonucleotide

DNA does not have OH group on 2′ carbon, but RNA does

The hydrogen on the 3′ carbon goes away and the Oxygen bonds to the first phosphorous on the chain of the next DNA triphosphate (phosphodiester linkage)

The C and G base pairs combine with hydrogen bonds
C and G is 3 hydrogen bonds, A and T is 3 hydrogen bonds

for double stranded dna, one strand goes 5′ to 3′ and the other goes 3′ to 5′ (antiparrallel)

major and minor groves because one faces up and one faces down so the phosphates are closer (minor groove)

A-form DNA is where the bonds are twisted, so the major and minor grooves don't really show up
B-form DNA is normally bonded nitrides

Watson and Chris

DNA is information storage
predics mechanism for replication mutation = change in DNA sequence

length of DNA in number of nucleotide pairs (base pairs)

human genome is 3 Gigabases

B-form DNA is 10.5 base pairs / turn diameter of DNA is 2nm

e-coli genome is 4 Mega bases

T2 genome is 100 kilo bases

stretching out the genome of e-coli is 1mm, but the cell is 1um

DNA replication

DNA -> RNA -> protien

dNTPs: dGPT, dCTP, dATP, dTTP
need a template
need an ensyme to polymerate DNA together: DNA polymerase

sulfamethoxazole, trimethoprim: drugs that block DNA replication in bacteria

models: conservative, semi-conservative, dispersive
conservative is stay the same and make new independent copy
semi-conservative is they split in half and replicate the other half
dispersive is some mix of the two which would be cooked

meselson/stahl
take ecoli and grow it in Nitrogen 15
The heavy nitrogen gets incorpirated in the DNA
switch them and grow them in regular nitrogen
The DNA is centrefuged for both, and the DNA after regular N becomes lighter

Run the process twice and see the layers shift again

elongation
always extending from 5′ to 3′
diphosphate is broken and released to be replaced with the 3′ OH bond The OH bonds is free to the next thing which keeps the DNA polymerase going

Arthur Kornberg
dNTPs + template but didn't work
Also need a primer to show DNA polymerase to where to start
Primer is the first little part of double stranded DNA

Ecoli has like 4000 protiens
Lyse the cells during ecoli replication process to try and find DNA polymerase
start fractionating ly states (maybe mass, charge, hybrophorisity)
take various fractions, add different fractions to the primed DNA, see which one extends the chain

he found DNA pol 1, however the actual one that does it in the cell is DNA pol 3
DNA pol 1 is sufficient, but it wasn't necessary rip