

L1 7.015

Definitions

DNA - information carrier

RNA - information intermediate

Reverse transcriptase (In some cases rna can become dna)

RNA and DNA are nucleic acids

Protiens - provided cellular functions, structures

- Enzymes - biological catalyst
- Provide information

Gene - Stretch of DNA that codes for RNA and/or protein

Genotype - set of genes

Phenotype - physical manifestation of that genotype

Fundamental 20th century science

Gene, Atom, Bit (information)

4 Types of experiments

1. Coorelations

- DNA is in nuclei and is major component of chromosomes
- Soma cells 2N / germ cells 1N (germ cells have half the DNA)
- Different species have different amounts of DNA

2. Show that something is Necessary

Done in 1944 by Avery

- Take S + heat treatment
- Add DNase (these are enzymes)
- Add RNase (chops up rna)
- protienase (chops up protien)
- After each, add it to Rough strand
- Only the DNase kept the mouse alive (this means transformation needs DNA)

3. Something is Sufficient Show that the DNA is sufficient to transform the rough strand

- Purify DNA from S, then add it to the R strain
- The mouse still died
- Can purify DNA through chemical treatments (isolate different parts of cells)
- People were skeptic that the DNA was pure enough and protiens remained

4. Seeing is believing 1952 - Hershey/Chase

- They were studying how viruses affected bacteria
- Virses are protiens surrounding DNA
- Infect ecoli, wait 20 minutes, the cell died, and now there are more viruses
- Ecoli with T2 (50 viruses per ecoli)
- Viruses called bacterio(phages)
- P32 - allows DNA labeling, S35 - labels protiens
- 20 minutes kills the ecoli
- so experiment goes for 10 minutes (after infection)
- Centerfuge sample (denser things go to the bottom)
- Pellet at bottom, and supermatant ontop
- Pellet contains P32, while supermatant had S35

- This means the virus injected the DNA, while the protein stayed on the outside

Griffiths Experiment

Strept pneumoniae - genetic transformation

Smooth and rough

Smooth killed the mice, but rough didn't

Took smooth strain and heated it up (killed the bacteria)

(Smooth+heat)+Rough killed the mouse

This means that rough strain acquired genetic material from the other ones

Conclusions

- R is transformed by something in S
- That must be a heritable factor

Not all bacteria pull DNA into environment from themselves

DNA Structure

1. Chemical composition

- Polymer - each monomer -> sugar deoxyribose
- Phosphate
- Nitrogenous base

2. Chargaff's rule

- Purines: adenine (A), guanine (G)
- Pyrimidines: Cytosine (C), Thymine (T)
- Amounts roughly A = T, and C = G

3. Franklin's X-ray images

- Take images to find chemical compositions of stuff like salts
- But also works for more complicated structures like DNA
- Key to understanding structure of DNA but was used without consent lol

4. Double strand DNA

- Outside is the sugar-phosphate backbone
- Inside is the nitrogenous bases (these come in pairs)
- The DNA is right-handed spiraled
- Right hand rule up the thumb, around the fingers
- The two strands are anti-parallel (they run in opposite directions?)
- There's a contour to the DNA, like wobble (DNA helix isn't straight)
- There are major and minor grooves (bending kinda) in the DNA
- Single stranded DNA is a different thing