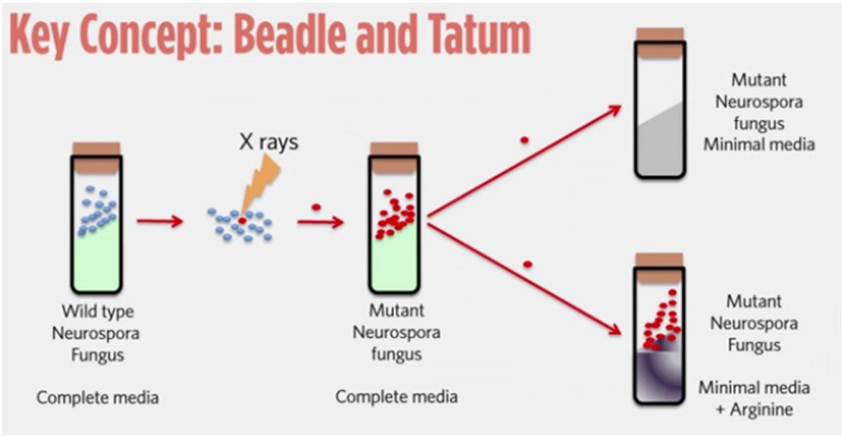
Beadle and Tatum Experiments

Complete media- Growth medium that contains all of the growth requirements of the mould
Minimal media- Growth medium that contains the minimal necessities (no amino acids) for growth

Summary of experiments and observations

- Neurospora mould was grown on minimal medium
- Mould was irradiated to induce mutations
- The exposed fungus were inserted into different colonies of complete media to isolate a population of individuals that had undergone mutations when exposed to the x-rays. On the complete media, colonies of the fungus are able to grow and reproduce
- Some individuals from each of these colonies are exposed to minimal media
- Mould that could not grow on the minimal medium but grew on the complete medium were identified to be mutated.
- Mutants were transferred to test tubes each containing one different amino acid supplement.
- Mutants that had lost the ability to make a particular enzyme (e.g. for the amino acid arginine) could grow on the minimal medium supplemented with that amino acid.
- To test that whether this mutation had a genetic basis, the mutant moulds were crossed with normal moulds to see whether the mutation was genetic. They found some offspring had a mutant phenotype, proving that the inability to produce an amino acid could be inherited



Conclusions

- X rays caused mutation of a single gene. This resulted in a single protein not being produced.
- By adding the product of that gene (Arginine in this example), normal growth recommences
- When normal mould grows on a minimal medium, it doesn't have a mutation. It has the enzymes to convert the base materials in the medium to amino acids for growth.
- When irradiated mould is grown on minimal medium, it doesn't grow since it doesn't have the enzyme to convert basic substances into amino acids for growth.

"one-gene - one enzyme" hypothesis changed to "one gene - one protein"

- It was demonstrated that genes code for proteins other than enzymes such as haemoglobin

“one-gene - one protein” hypothesis changed to “one gene - one polypeptide”

- It was demonstrated that a gene does not control the synthesis of one protein but one polypeptide.