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Biology Topic B15
Genetics and Evolution

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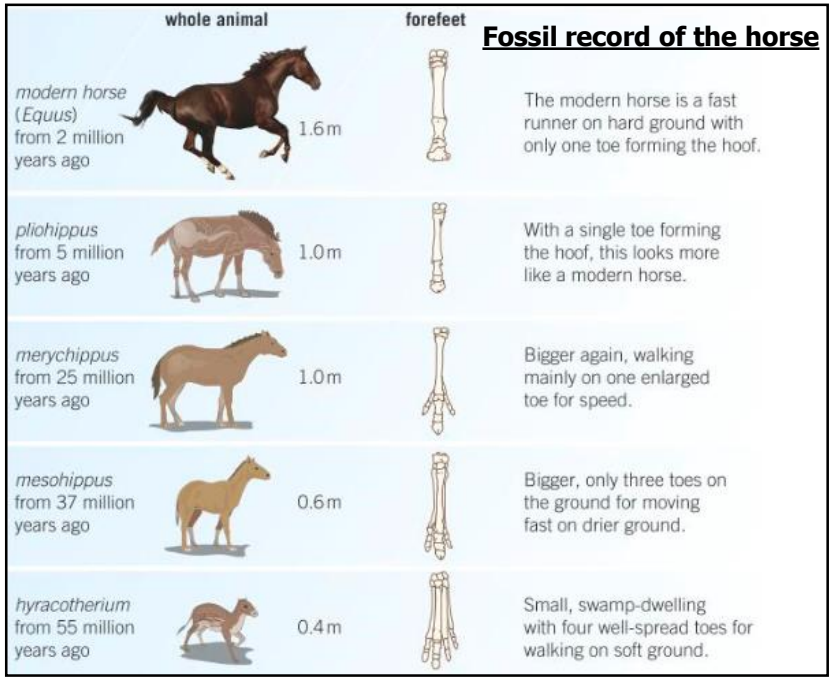
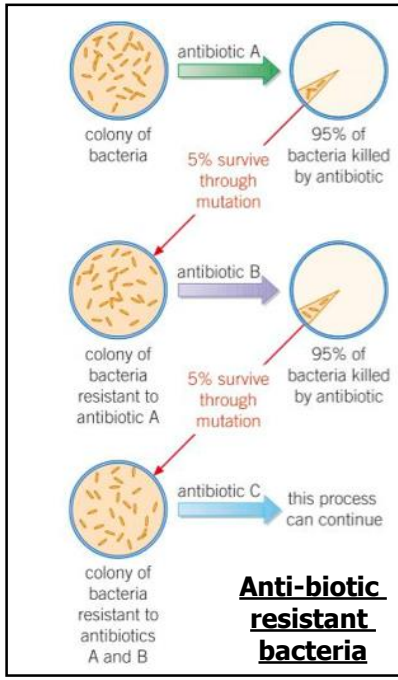
Section 1: Evidence for evolution	
Fossil	The preserved remains of an organism from many thousands of years ago. Formed by either gradual replacement by minerals, casts/impressions or preservation in places where there is no decay like amber
Resistance bacteria	Bacteria can evolve and become antibiotic resistant. Bacteria sometimes develop random mutations, allowing them to survive an antibiotic, they reproduce increasing the population size of antibiotic resistant bacteria

Section 2: Extinction	
Reasons	Rapid environmental changes, new predators, new diseases, better competitor, catastrophic event e.g. volcanic eruption

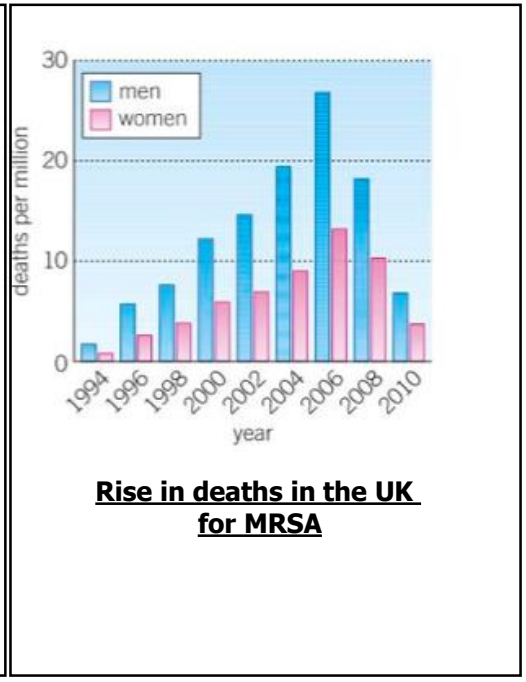
Section 3: Classification and evolutionary trees	
Classification	Organising living organisms into groups
Carl Linnaeus system	Kingdom → Phylum → Class → Order → Family → Genus → Species
Carl Woese 3 domain system	Archaea, Bacteria, Eukartota are the main large groups which are then divided into smaller groups using the keyterms above (kingdom etc…)
Binomial system	Give a 2 part name in Latin to every organism e.g. *Homo sapiens*
Evolutionary trees	Show common ancestors and relationships between species



Fossil record of the horse



Anti-biotic resistant bacteria



Rise in deaths in the UK for MRSA

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Biology Topic B15
Genetics and Evolution (separate)

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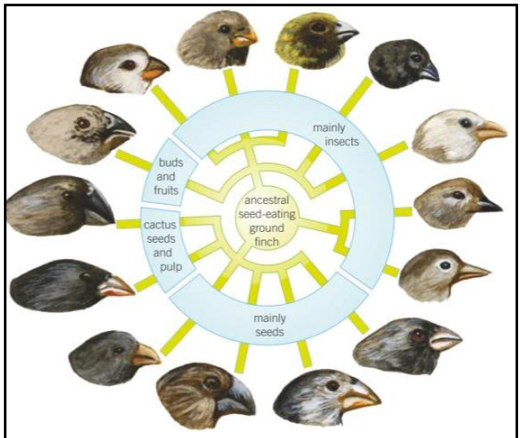
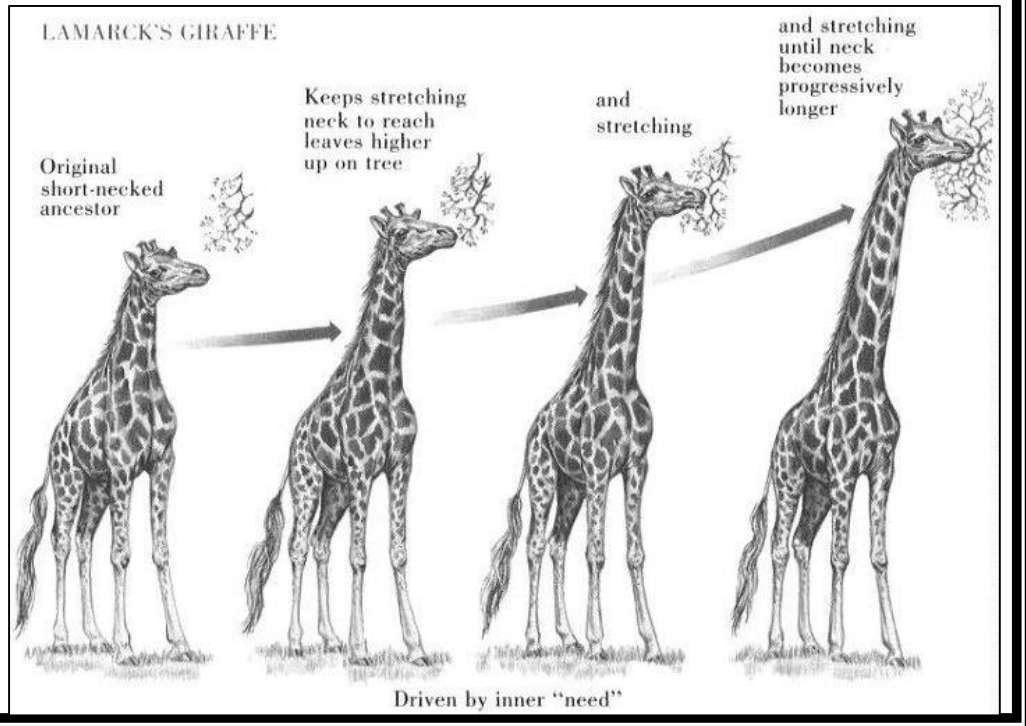
Section 1: Darwin V Lamarck	
Darwin's idea	Evolution by natural selection
Controversy at the time	People **did not believe Darwin** at the time because: - It went against religious beliefs - DNA/genes/the mechanism of inheritance was not understood at the time - There was not enough evidence to convince other scientists
Lamarck's idea	Evolution by acquired characteristics - Organisms that use a characteristic a lot during its lifetime would become more developed e.g. a rabbit using its legs a lot to run would become longer - Then the organisms offspring would inherit this characteristic e.g. the rabbits offspring would also have longer legs
Section 2: Speciation	
Species	A group of similar organisms that can reproduce to give fertile offspring
Speciation	The development of a new species



How the Finch has evolved

Speciation

- two ancestral populations get separated by geographical barrier / by land or sea / were isolated
- genetic variation (in each population) or different / new alleles or mutations occur
- there are different environments / conditions in these two separate areas
- natural selection occurs or some phenotypes survived or some genotypes survived
- (favourable) alleles / genes / mutations passed on (in each population)
- eventually two types cannot interbreed successfully



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Genetics and Evolution (separate)

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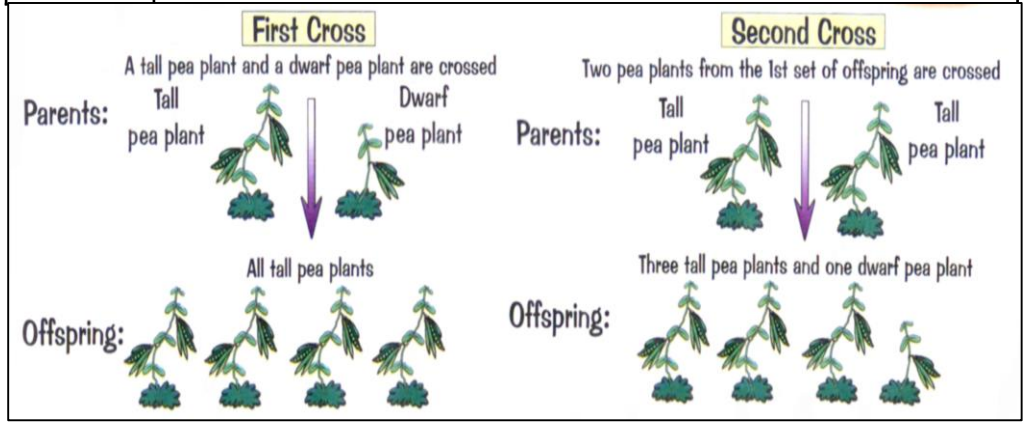
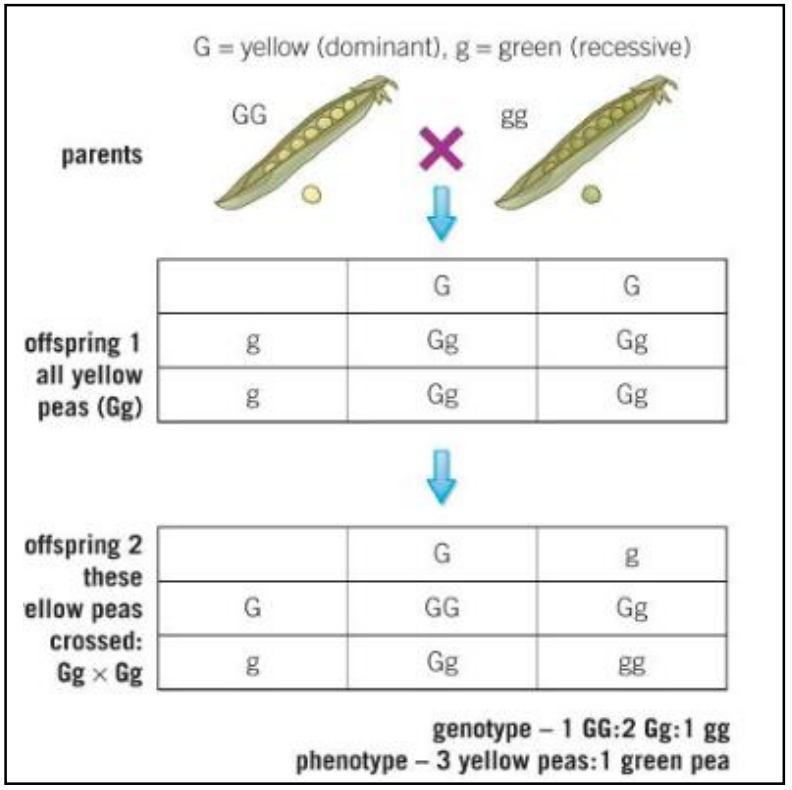
Section 3: Mendel

Mendel	A monk who's research led to the foundation of modern genetics



Experiments	In the mid-19th century Mendel carried out breeding experiments on pea plants. He observed that the inheritance of each characteristic is determined by 'units' that are passed on from parents to offspring
Rejection	Mendel's work was rejected at the time because: - he was just a monk (not a scientist) - chromosomes / DNA / genes not seen / discovered / known at the time - other theories accepted at the time



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