EDEXCEL GCSE NATURAL SELECTION AND GENETIC MODIFICATION PART 1

Charles Darwin	*Theory of evolution by natural selection.*	Individual organisms within a particular species show a wide range of variation for a characteristic.
		Individual most suited to the environment are more likely to breed successfully.
		Characteristics enable individuals to survive are then passed on to the next generation.

Developed since its proposal from information gathered by other scientists.

Did much pioneering work on speciation but more evidence over time has lead to our current understanding.

Evidence from around the world, experimentation, geology, fossils, discussion with other scientists (Alfred Wallace) lead to:

Theory of evolution (Biology only)

Alfred Wallace	*Independently proposed the theory of evolution by natural selection*	Published joint writings with Darwin in 1858.
		Worked worldwide gathering evidence.
		Best know for work on warning colouration in animals and his theory of speciation.

Charles Darwin 'On the Origin of the Species' (1859)	*Published the theory of evolution by natural selection*	Slowly accepted; challenged creation theory (God), insufficient evidence at time, mechanism of inheritance not yet known.

Both Darwin and Wallace's work contributed to the modern science of genetics and 'molecular biology'.

Human evolution

Evidence for human evolution	
Fossils	*Stone tools*
Ardipithecus ramidus 'Ardi' from 4.4 million years ago	Earliest simple stone tools from 3.3 million years ago.
Australopithecus afarensis 'Lucy' from 3.2 million years ago	
Leakey's discovery of *Homo habilis* from1.6 million years ago	The age of different layers of rock can be dated. Stone tools found in those layers are the same age.

The full human classification

Classification of living organisms

Carl Linnaeus classified living things		
	Kingdom	Animalia
	Phylum	Chordata
	Class	Mammalia
	Order	Primates
	Family	Hominidae
	Genus	*Homo*
	Species	*sapiens*

The five kingdoms are animals, plants, fungi, protista, prokaryotes

Carl Woese
3 domains instead of kingdoms based on genetic analysis.
Archaea (primitive bacteria), true bacteria, eukaryota.

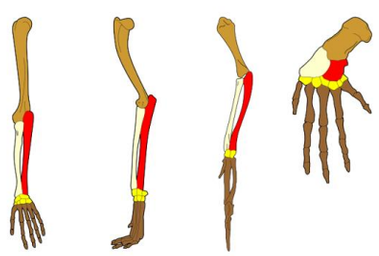
Evidence for evolution

Antibiotic resistant bacteria	*Mutations produce antibiotic resistant strains which can spread*	Resistant strains are not killed.
		Strain survives and reproduces.
		People have no immunity to strain and treatment is ineffective.

Antibiotic resistance in bacteria provides evidence for evolution.

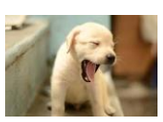
Evolution is widely accepted. Evidence is now available as it has been shown that characteristics are passed on to offspring in genes.

Evidence for evolution from anatomy (Biology only)
The pentadactyl limb
Darwin suggested that the five finger (pentadactyl) limb found across many vertebrates suggest a common ancestor.



Selective breeding

Selective breeding
Choosing parents with the desired characteristics from a mixed population
Chosen parents are bred together. ⇩ From the offspring those with desired characteristics are bred together. ⇩ Repeat over several generations until all the offspring show the desired characteristics.

Choosing characteristics	
Desired characteristics are chosen for usefulness or appearance	
Disease resistance in food crops.	
Animals which produce more meat or milk.	
Domestic dogs with a gentle nature.	
Large or unusual flowers.