Biology
Chapter 4

Natural selection and evidence for evolution

Evolution

Evolution means living things slowly change over many generations

Charles Darwin explain evolution using his idea called natural selection

Natural selection means survival of the fittest

- **In every population individuals are different because they have different genes.How a alleles appear by mutations**
- **Things like predators, lack of food lack of water or competition ,formats are called selection pressures, These effects explain how well an organism can survive**
- **Individuals that have useful characteristics like better adapted to environment they survive more easily and are more likely to breed**
- **Overtime the helpful alleles become more common in the population**

A species that cannot compete well may become extinct

Bacteria provide evidence for the evolution

- **Bacteria sometimes get random DNA mutations**
- **These create the new Alleles**
- **These new alleles can change the characteristics**
- **for example a bacterium can become resistance to an antibiotic**
- **Antibiotic resistance is a big advantage**
- **when someone takes antibiotic a resistance bacterium survives longer than a non resistant one**
- **It can reproduce many more Times**
- **this is natural selection overtime their resistant alleles become common**

Process

- **There is a variation in the bacteria population**
- **Some bacteria have resistant alleles**
- **Antibiotic kill the non resistant bacteria**
- **Resistant bacteria survive and reproduce**
- **The resistant allele becomes more common**

- Antibiotic resistance is evidence for evolution because bacteria become better adapted to an environment where antibiotics exist
- Other organisms like rats that become resistant to poison also give evidence for evolution

Fossil evidence for human evolution

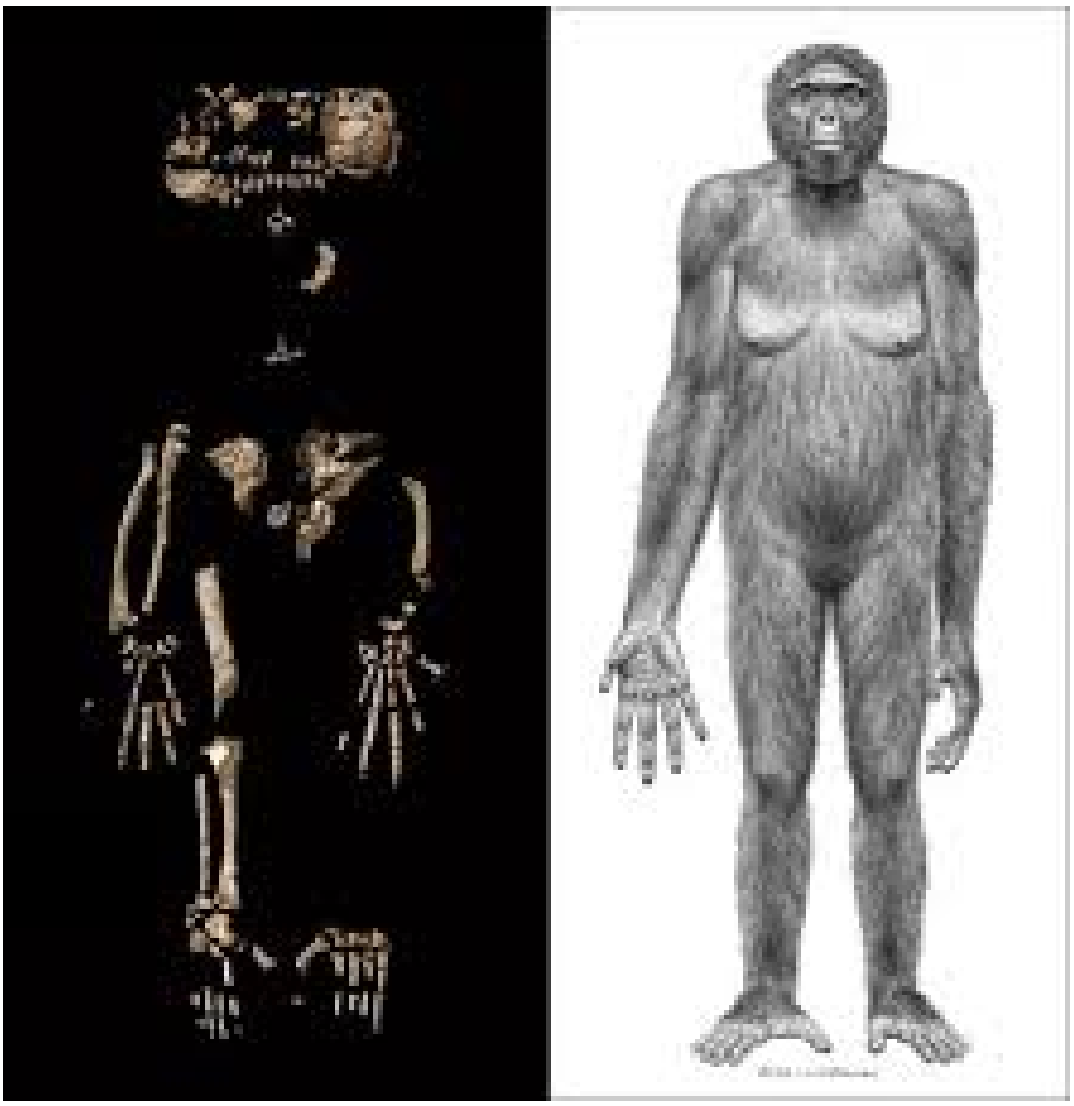
- There is a lot of fossil evidence that humans evolved from common ancestor shared with other apes

What fossil fossils tells us

- Evidence shows humans and chimpanzees has common ancestors around 6 million years ago
- Humans and their ancestors are called hominids
- Many different hominids fossils have been found
- These fossils show features between Apes and humans
- By studying hominids fossils we can see how human change over the time

Ardi- 4.4 million years old

- ardi is a Fossil of ardipithecus ramidus found in Ethiopia
- ardi has both Ape like and human like features
- Her feet shows she climb the trees
- she had an ape like big toe to hold the branches
- she had long arms and short legs like an ape
- her brain size was similar to chimpanzee
- her leg born show she walked up right like a human
- her hand bones show she did not walk on our hands like the ape do



Lucy - 3.2 million years old

- Lucy is a Fossil of australopithecus afarensis it is also found in Ethiopia
- Lucy was more like human then Ardi
- She had arched feet for walking and no ape like big toe
- her arms and legs were between ape and human size
- her brain was slightly bigger than Ardis but close to Chimp

- her leg and foot bones show she walked upright better than ardi



Turkana boy- 1.6 million years old

- In 1984 Richard Leaky and his team found many fossils in Kenya
- One Fossil was turkana boy a homo erectus skeleton

Turkana boy had

- Short arms and long legs like a human
- A much smaller brain than Lucy close to human size
- Leg and foot bones that show he walked up right very well

Timeline of human evolution

1. Ardipithecus (Ardi)
2. Australopithecus (Lucy)
3. Homospecies (Turkana boy)
4. Modern Humans

This show humans become more human like through the time

Stone tools give more evidence

As homeo species evolved they made stone tools these tools became more Complex showing brain size increased

How scientist find the age of tool and fossils

Structure of tool

- simple tools are older and complex tools a newer
- Stratigraphy study of Rock layers deeper layers are older

- carbon 14 dating if a tool has carbon material like wood carbon 14 can show its age
- Dating is not always perfect because Rock layers can move

Classification of living things

Old system ; five kingdoms

- Animals
- Plants
- Fungi
- Prokaryotes
- protists

These they are divided into

● Kingdom ● Phylum ● class ● order ● Family ● genus ● species

Classification changed over the time

Woese found that old Kingdom has two different groups he divided them into

archaea and bacteria

Archaea look like bacteria but are genetically very different like in extreme conditions

Bacteria , like e coli

eukarya fungi plants animals protest these domains are them divided to smaller groups like before