

### Key Questions

- 1) Why do living things vary?
- 2) Why do living things become extinct?
- 3) What evidence is there that living things changed over time?
- 4) How do living things survive?
- 5) How does the environment affect plants?
- 6) How can one type of animal become two?

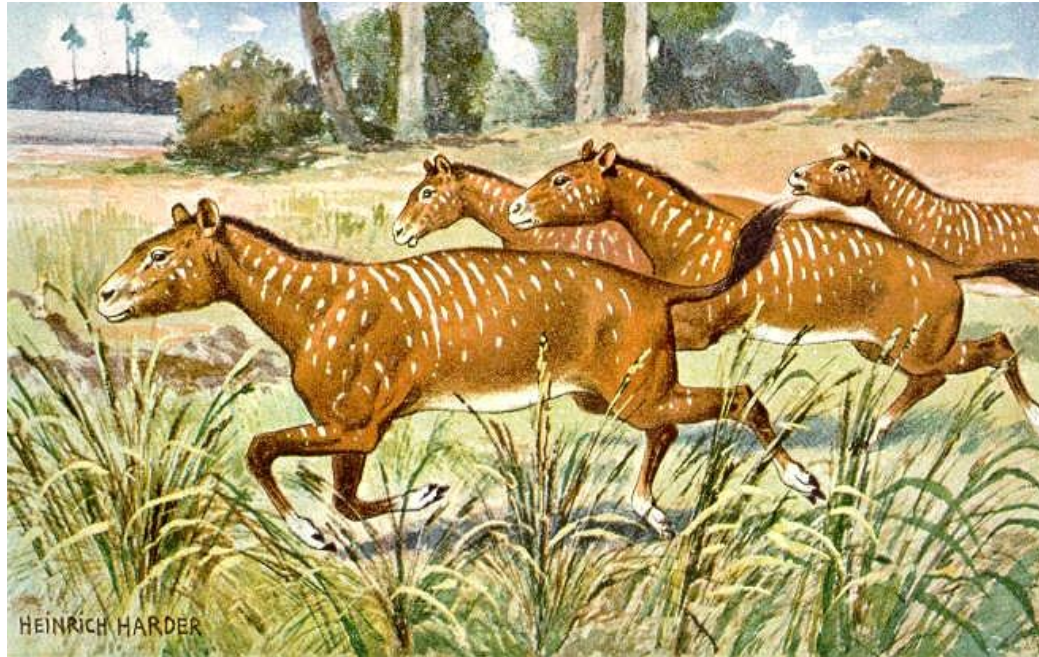
Word
Population
Variation
Inheritance
Adaption
Selective breeding
Characteristics
Fossils
Evolution
Genes

# What can we learn from fossils?

1. Life on Earth is very old.
2. Fossil records provide evidence that life has evolved.
3. Fossils provide us with evidence that many life forms have become extinct.
4. Fossils help us to understand ancient environments.
5. Fossils can show us how ancient organisms lived and grow.



In this lesson, we will be focussing on the 2<sup>nd</sup> point –  
how fossils provide evidence that life has evolved.



Here is an artist's interpretation of what horses looked like 40 million years ago.

Do they look the same as the horses that live today?

What differences do you see?

What similarities do you see?

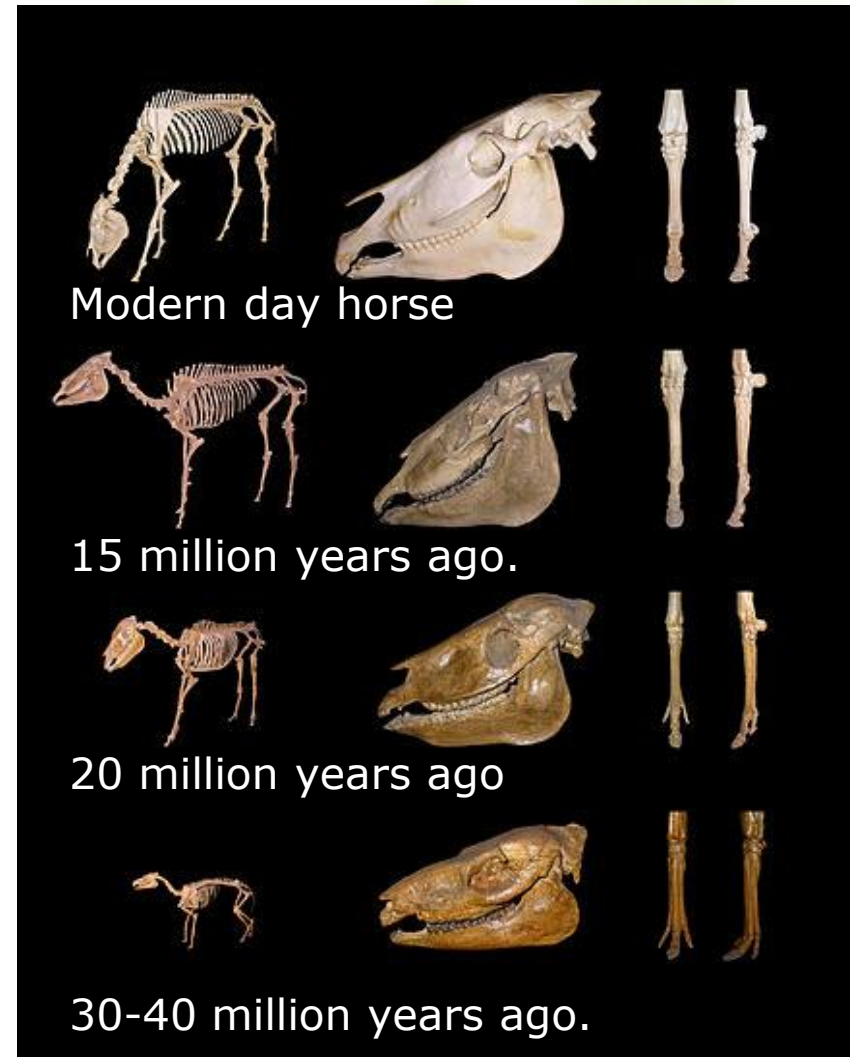
# LO: To recognise the development of evolutionary theory

The pictures on the right are fossils of horses from different time periods.

Over a period of 40 million years, horses have slowly changed from small dog-like creatures to the strong, tall animals they are today.

When a species changes over time like this, we say it has *evolved*.

We call the process ***EVOLUTION***. It is even possible for a split into 2 new species.





All animals and even all plants have experienced evolution.

This picture shows how corn has changed from its ancestors.



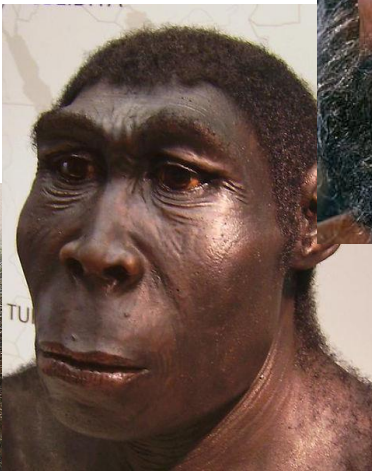
Even humans have evolved.

This photo shows what human ancestors might have looked like.

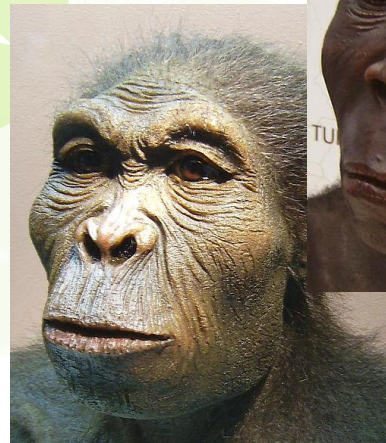
It has been recreated from fossils that are 0.5 million years old.

These are pictures of even older human ancestors, from 2.5 and 1.8 million years ago.

What do you notice about early humans?



Images by wikimedia  
user Lillyundfrey



If you thought that early humans looked a lot like monkeys, you would be correct!

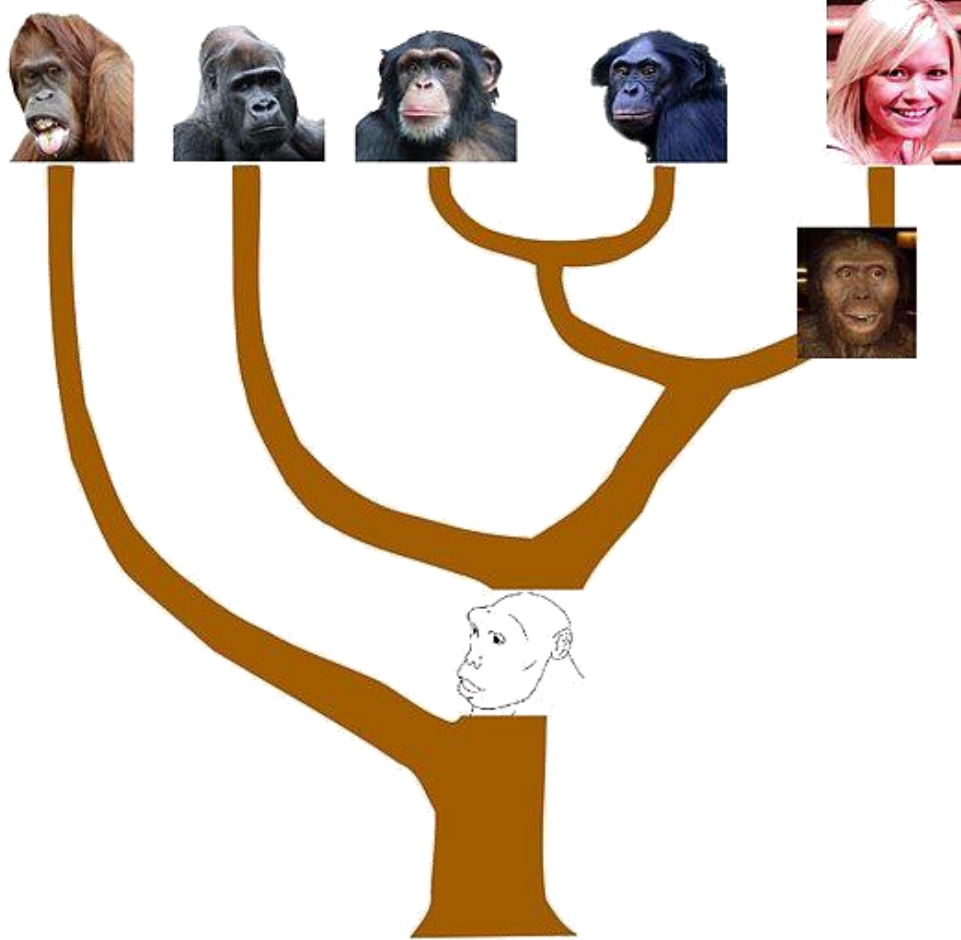
This image is a skeleton of a notharctus, a species of ape from 50 million years ago.

Early primates evolved into several different species. Some of these would become humans...



Others would evolve into the primates we see today.





Many different species can evolve from a single species.

If we look back further in time, we see that humans share ancestry with even more animals.

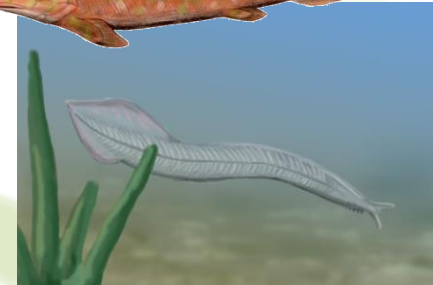


We have traced back human ancestry all the way to the ocean, where the first signs of life are found to exist from almost 4,000 million years ago.



These are a few of the species in the chain of evolution that eventually led to humans.

These species also evolved into many of the creatures you see today.





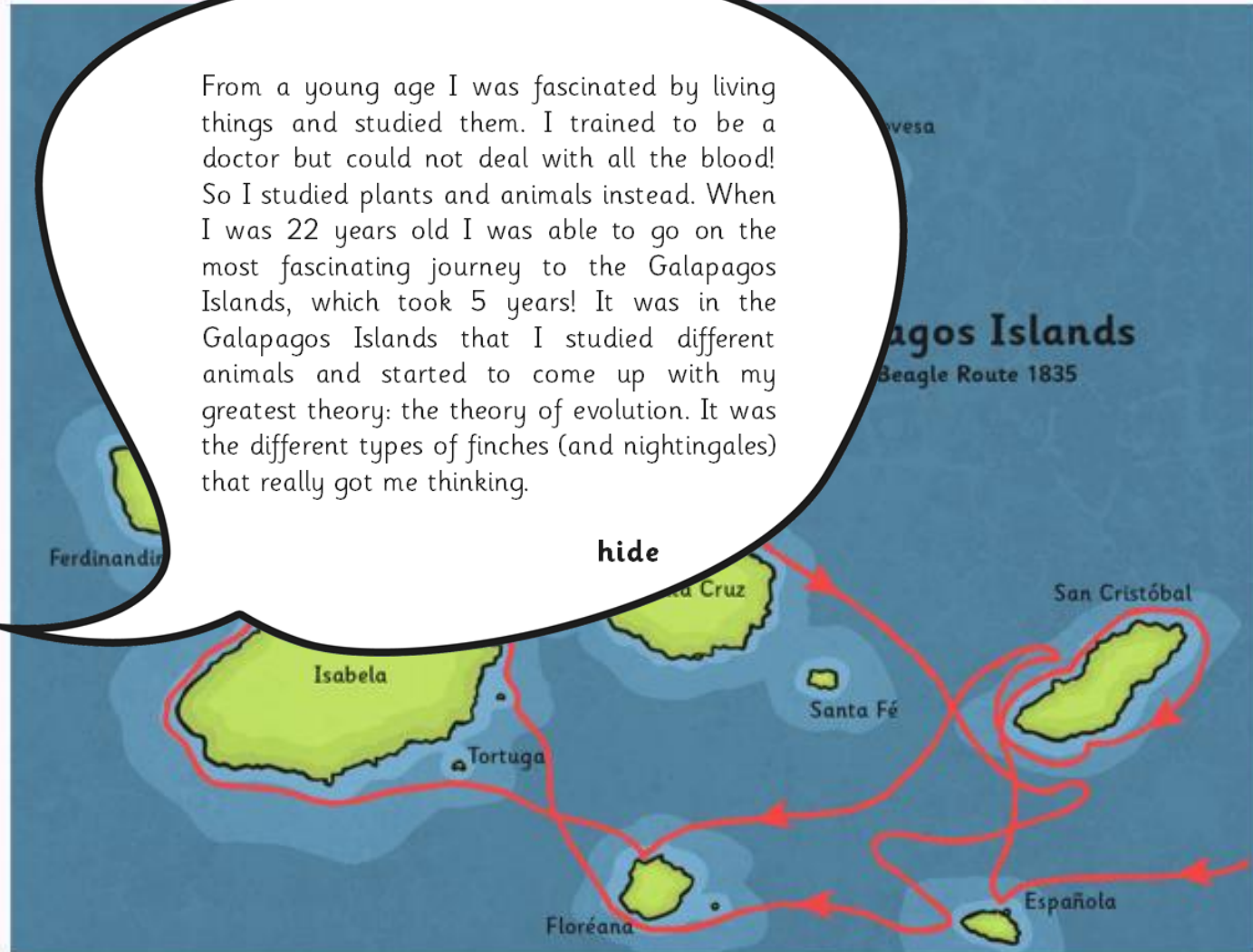
# Theory of Evolution

## Darwin and the HMS Beagle



**Charles  
Darwin**  
(1809 – 1882)

From a young age I was fascinated by living things and studied them. I trained to be a doctor but could not deal with all the blood! So I studied plants and animals instead. When I was 22 years old I was able to go on the most fascinating journey to the Galapagos Islands, which took 5 years! It was in the Galapagos Islands that I studied different animals and started to come up with my greatest theory: the theory of evolution. It was the different types of finches (and nightingales) that really got me thinking.



# Theory of Evolution

## The Galapagos Finches

I observed that there were lots of different types of finches. People believed that these were different species of birds that happened to have some similarities.



However, I realised that these birds were varieties of the same species and were related.

I thought that all the Galapagos finches had originated from one type of finch. The parents reproduced and created offspring. These offspring would have varied.

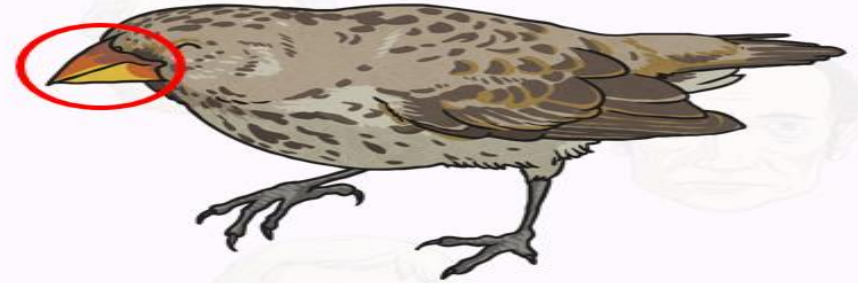
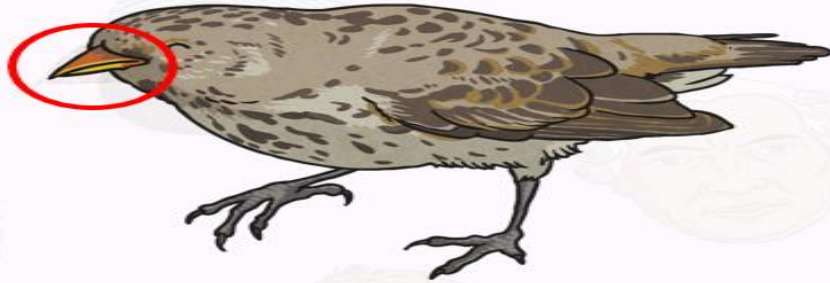
In one part of the Galapagos Islands, bad weather affected the plants and so only those with larger seeds were left. Those finches who had slightly larger beaks were able to eat these seeds while those with smaller beaks could not.



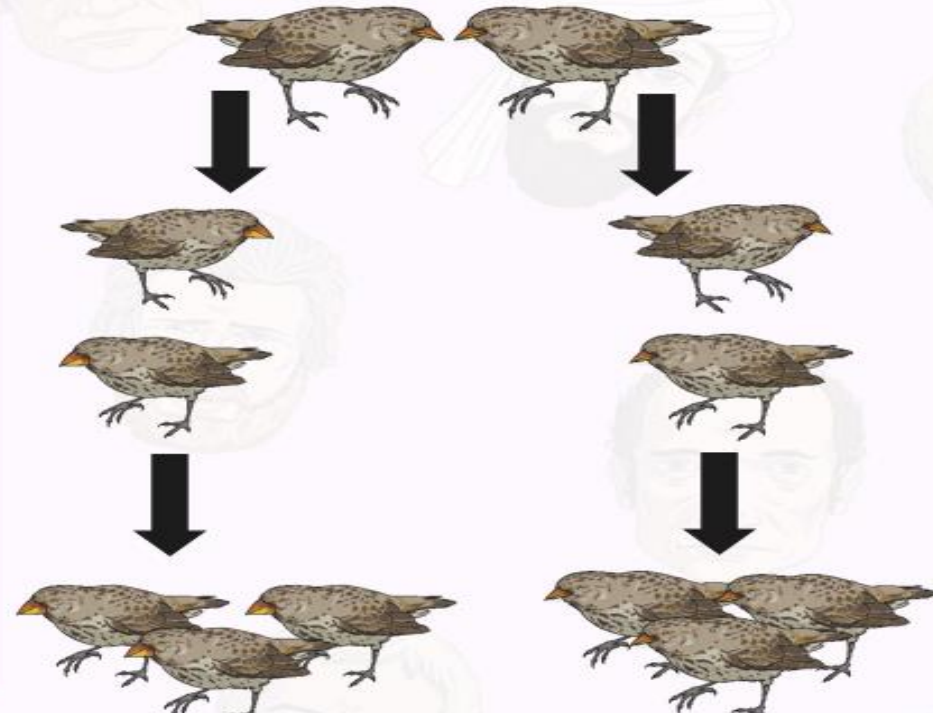
# Theory of Evolution

## The Galapagos Finches

Only the offspring with large beaks could break open and eat the larger seeds. Therefore, these offspring survived and the other, smaller beaked offspring died. 'Survival of the fittest' means those that are most suited to their environment as a result of their inherited or adaptive traits survive while others do not.



The Galapagos finches with large beaks reproduced and had offspring. More of these offspring inherited large beaks and survived. In other parts of the Galapagos, smaller beaks ensured better survival than larger ones, larger eyes than smaller ones, etc. The adaptations caused by variation meant that over a long period of time the Galapagos finches evolved adaptive traits that caused differences between them.





# Theory of Evolution

## The Galapagos Finches

These offspring would also have differed due to inherited and environmental factors and so eventually over time stopped resembling their common finch ancestors.

Evolution is the process of **adaptation** over a long period of time.

This process, whereby certain inherited and adaptive traits allowed them to live and reproduce while others became extinct, is called **natural selection**.

### Finch Ancestors



Different varieties of finches who evolved from a common ancestor that exist today.



# Task

Read the fact sheets.

Use the information on the fact sheets to identify the true or false statements.

Write the answers in your books.

statement	true	false
Tusi: Organisms can gain new features.	✓	
Augustine of Hippo: All mammals descended from 38 original animal types.		
Zhang Zhou: Animals struggle for existence.		
Epicurus: Strongest and most active animals survive and reproduce.		
Taoists: Thought the environment affected the attributes of living things.		
Anaximander of Miletus: The first animals lived in water.		
Pierre Louis Maupertuis: Adaptations only lead to new species.		
Charles Darwin: Natural selection does not involve competition.		
Alfred Wallace: Natural selection causes varieties of the same species.		
Charles Darwin: There is a single point of origin for all living things.		
Al-Jahiz: All animals had to struggle to survive, to find food and breed.		
Empedocles: Animals and plants look as though they have been designed but it's accidental they look the way they do.		

Compare Darwin's and Wallace's ideas about evolution.

How were they similar? \_\_\_\_\_

How were they different? \_\_\_\_\_

# What have you learnt about Evolution?

- What happens to a species over time?
- How do we know this?
- Have humans evolved?

