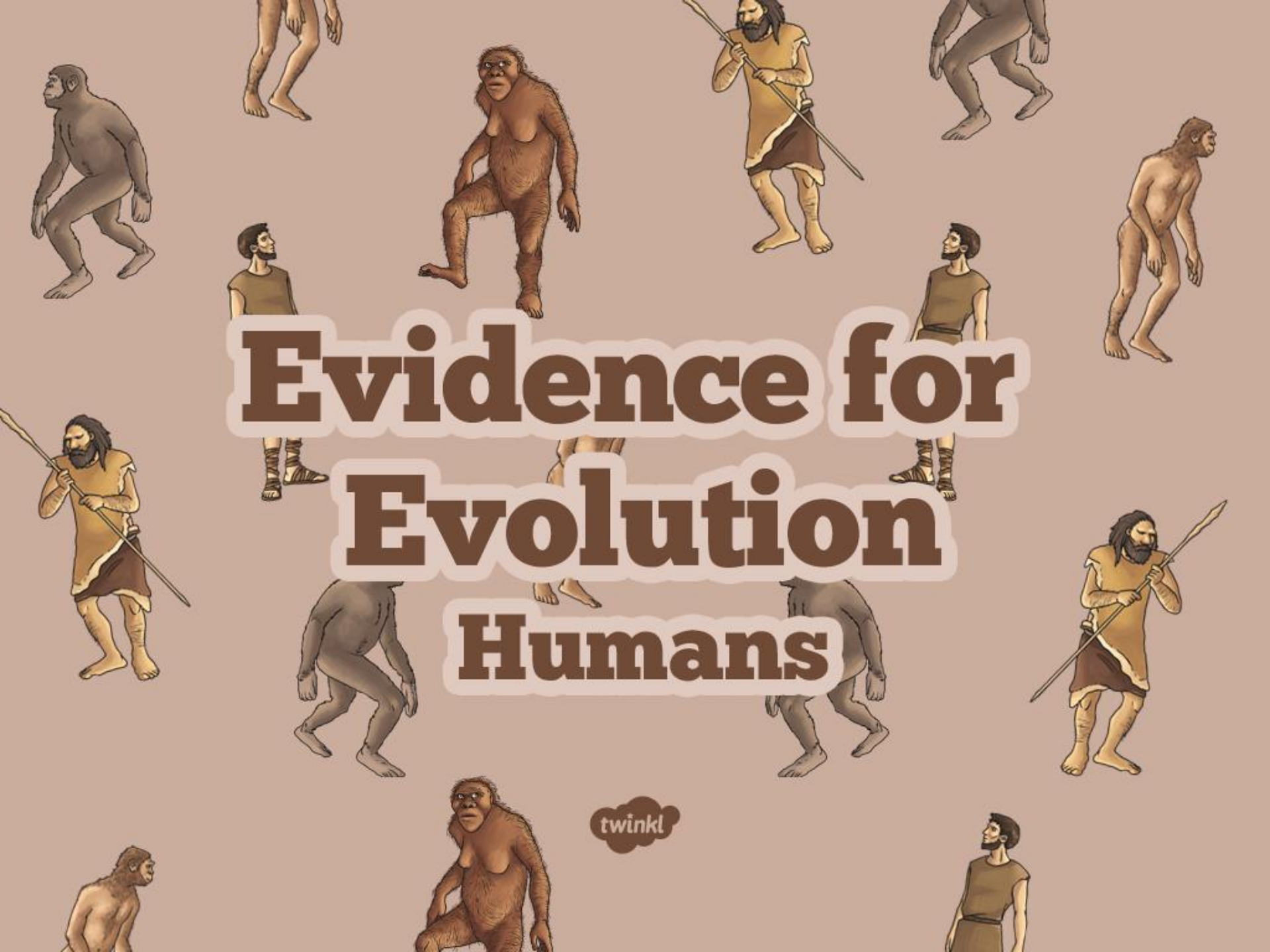
Science

Evolution and Inheritance


Evidence for
Evolution
Humans
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Aim

- I can understand how human beings have evolved.

Success Criteria

- I can identify adaptive traits in humans as a species.
- I can describe the known stages of human evolution.
- I can compare modern humans with members of the same genus and family.

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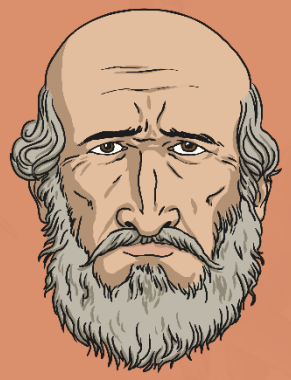
Controversy of Human Evolution

Darwin's theory of evolution built on the ideas of many theorists who, over the ages, had thought about the origins of human existence and links between humans and other animals:



Anaximander of Miletus (c. 610 – 546 BC): Greek Philosopher

Tusi (1201 – 1274): Persian Scholar

Ibn Khaldūn (1332 – 1406): Arab Historian

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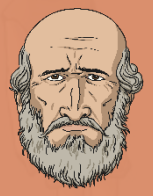
Controversy of Human Evolution



Anaximander of Miletus

Believed that land-dwelling ancestors of humans would have been born in the water and then spent some of their life on land.

Thought that the first human would have been the child of a different type of animal.

Tusi

Thought that some animals were more advanced than others and that humans developed from those advanced animals.

Suggested that humans came from apes that lived in Western Sudan (in Africa).

Ibn Khaldūn

Stated that humans developed from the world of monkeys by a process that led to numerous species.

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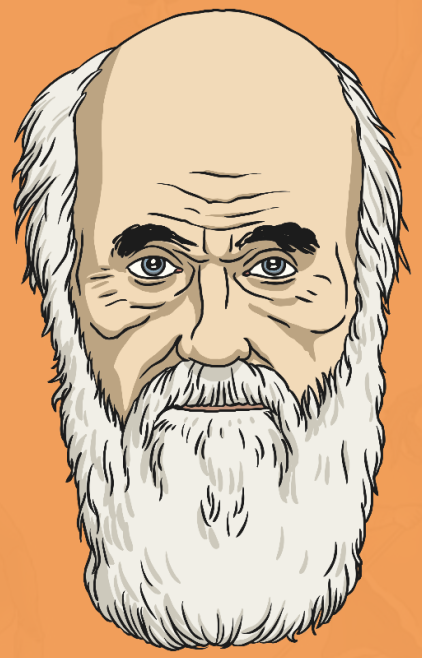
Controversy of Human Evolution

In science, the theory of evolution is seen as the most comprehensive theory of how humans came to be on Earth.

However, Darwin had shied away from publishing his findings as he knew it was a **controversial**. Indeed it was, and in his lifetime, the reception to his ideas was mixed.

Many people believed, for a number of different reasons, that humans were fundamentally different to other living things. Therefore they would not even have classed humans as animals.



controversial = an idea likely to give rise to disagreement

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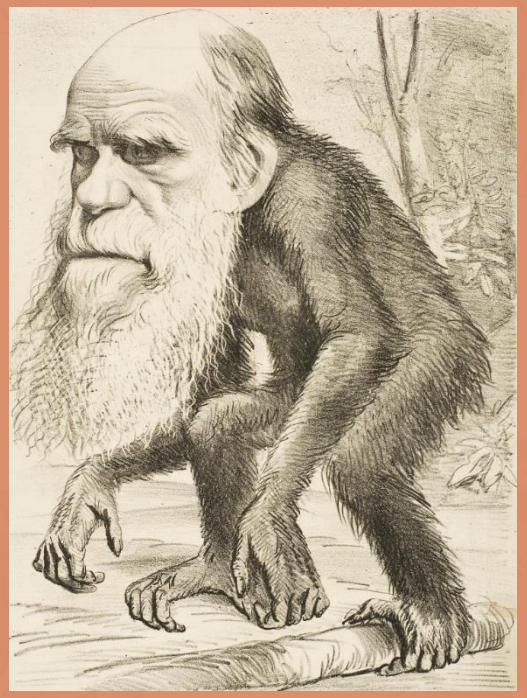
Controversy of Human Evolution

Most people would not have read the books and or come across the ideas that Darwin had. While he was building on the ideas of others, for many ordinary people, his ideas were brand new and a complete break from what they had thought before.

The cartoon to the right was one of many from people who were **sceptical** about his theory.



sceptical = not convinced, has doubts or reservations

"A Venerable Orang-outang", a caricature of Charles Darwin as an ape published in The Hornet, a satirical magazine

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Evidence for Human Evolution

The greater knowledge of **fossils** and their collection by scientists meant that in the 20th Century they were better understood when found.

Over the course of the last century many **fossils** have been found that demonstrate the evolution of humans (homo sapiens).

Initially, **fossils** were compared to the **human skeleton** to indicate the degree of similarity or difference. However, modern scientists have been able to map DNA in great detail and this gives them another way to compare how closely related we are to different living things in ways that could not have been detected by comparing skeletons alone.

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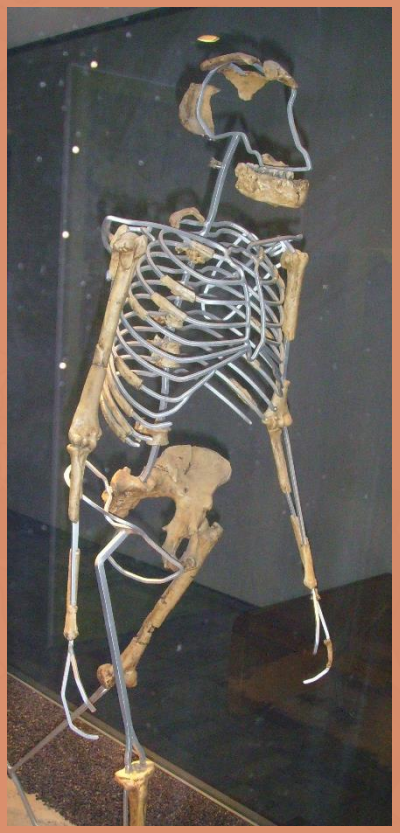
Evidence for Human Evolution



Australopithecus

Homo neanderthalensis

Homo neanderthalensis

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Biological Taxonomy

Before you explore the fossils further it is important to understand how we classify living things.

Biological taxonomy is a system of classification used by scientists. This system is based on the work on biological classification by **Carl Linnaeus**. In this system the lowest rank (**species**) is the most specific and the highest rank (**domain**) is the most general group that a living thing belongs to.

When referring to a living thing in this classification, it is done by adding the Genus and Species names together – so a human is a Homo Sapien, the lion is a Panthera Leo and large cacti is a Carnegia Gigantea.

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Biological Taxonomy

Taxonomic Rank	Example 1: Human	Example 2: Lion	Example 3: Large Cactus
Domain	Eukaryote	Eukaryote	Eukaryote
Kingdom	Animal	Animal	Plant
Phylum	Chordate	Chordate	Chordate
Subphyla	Vertebrate	Vertebrate	Angiosperms
Class	Mammal	Mammal	Dicots
Order	Primate	Carnivore	Caryophyllales
Family	Hominidae	Felidae	Cactacaea
Genus	Homo	Panthera	Carnegia
Species	Sapien	Leo	Gigantea

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Order, Family or Genus?

Whole Class

Sort the animals according to their relationship with human beings.

Order: Primates

Family: Hominidae

Genus: Homo

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Order, Family or Genus?

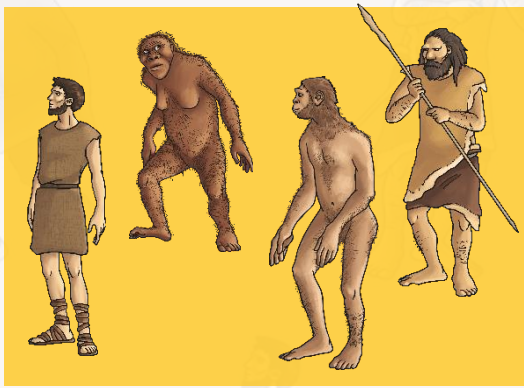
Answers

Whole Class

Order: Primates

Family: Hominidae

Genus: Homo



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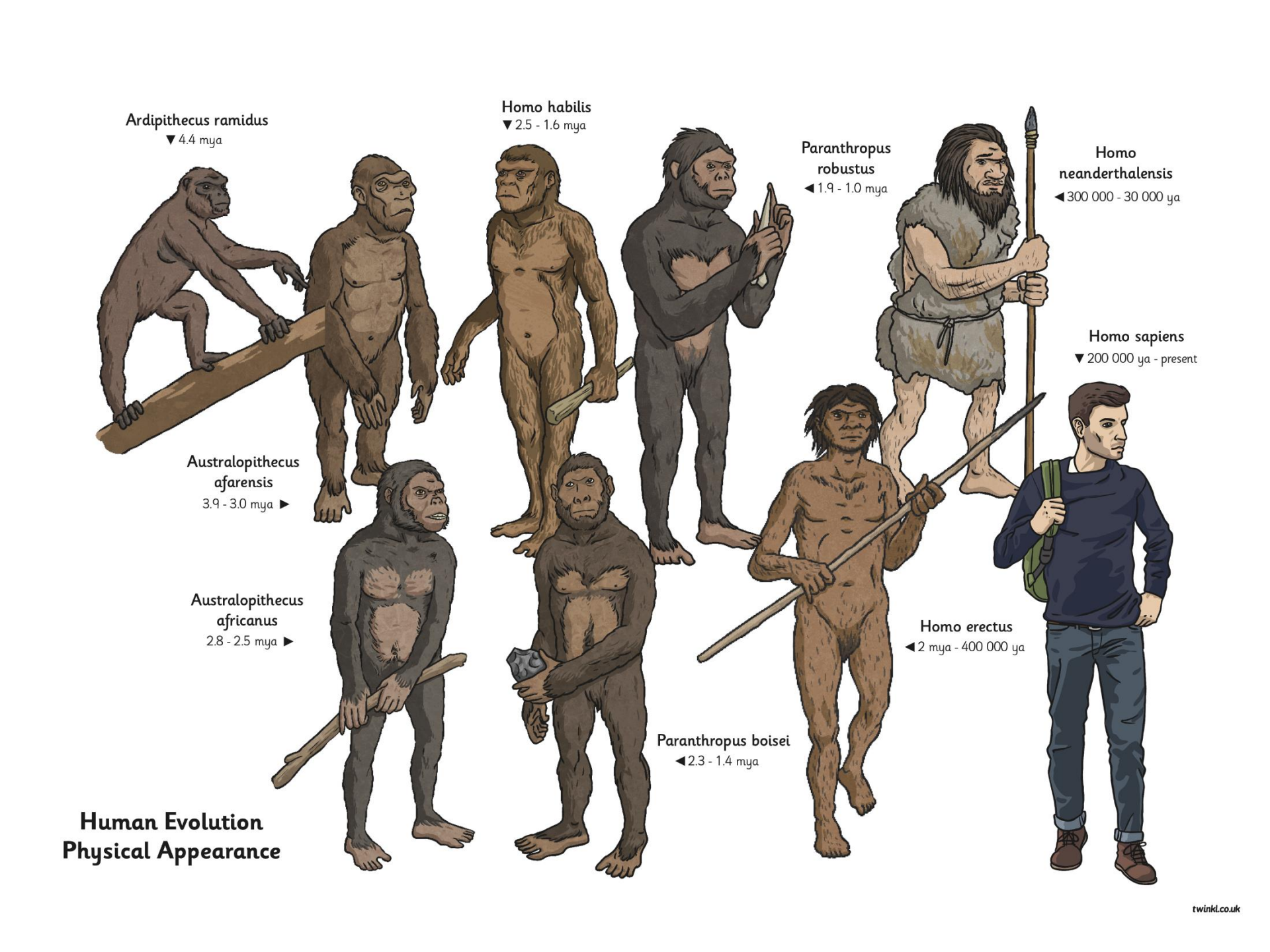
Ardipithecus ramidus
▼4.4 mya
Homo habilis
▼2.5 - 1.6 mya
Paranthropus robustus
◄1.9 - 1.0 mya
Homo neanderthalensis
◄300 000 - 30 000 ya
Homo sapiens
▼200 000 ya - present
Australopithecus afarensis
3.9 - 3.0 mya ►
Australopithecus africanus
2.8 - 2.5 mya ►
Homo erectus
◄2 mya - 400 000 ya
Paranthropus boisei
◄2.3 - 1.4 mya
Human Evolution
Physical Appearance

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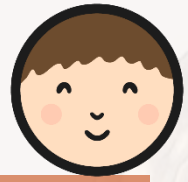
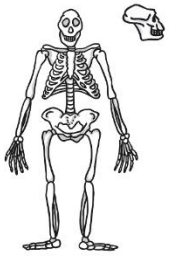
Human Evolution



Human Evolution

Compare the similarities and differences between a modern human and an Australopithecus Afarensis.

Physical Appearance		
Australopithecus Afarensis	Homo Neanderthalensis	Human

Physical Appearance		
		
Australopithecus Afarensis	Homo Neanderthalensis	Human

Physical Appearance	
Similarities between all three:	
Similarities between Australopithecus Afarensis and Homo Neanderthalensis:	Differences between Australopithecus Afarensis and Homo Neanderthalensis:
Similarities between Australopithecus Afarensis and Human:	Differences between Australopithecus Afarensis and Human:
Similarities between Homo Neanderthalensis and Human:	Differences between Homo Neanderthalensis and Human:
Skeletons	
Similarities between all three:	
Similarities between Australopithecus Afarensis and Homo Neanderthalensis:	Differences between Australopithecus Afarensis and Homo Neanderthalensis:
Similarities between Australopithecus Afarensis and Human:	Differences between Australopithecus Afarensis and Human:
Similarities between Homo Neanderthalensis and Human:	Differences between Homo Neanderthalensis and Human:

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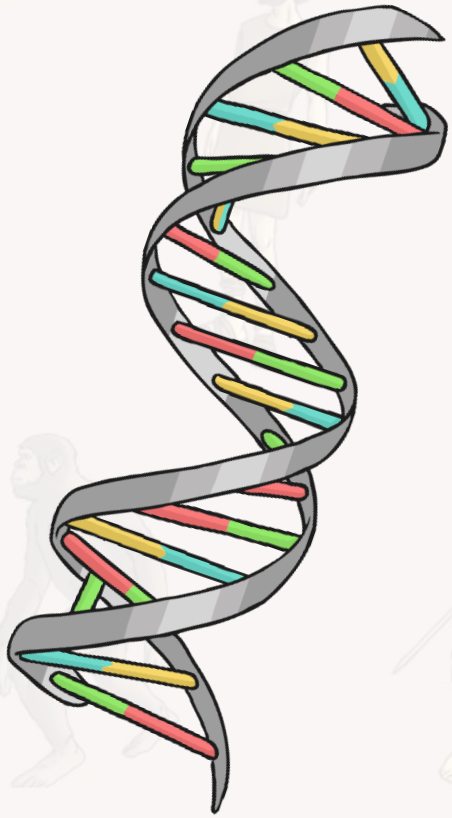
Shared DNA Quiz

The study of genetics and DNA is ongoing and scientists are making new discoveries as they research different aspects of DNA further.

This quiz will test you on the percentage of DNA that we share with other living things.



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Shared DNA Quiz

Whole Class

Click your answer to find out if it's correct.

a) 50.5%

b) 98.8%

c) 85.7%

Chimpanzee

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Shared DNA Quiz

Whole Class

Click your answer to find out if it's correct.

a) 98.2%

b) 96.5%

c) 99.7%

Homo Neanderthalensis

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Shared DNA Quiz

Whole Class

Click your answer to find out if it's correct.

a) 97%

b) 99%

c) 99.9%

Homo sapien

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Shared DNA Quiz

Whole Class

Click your answer to find out if it's correct.

a) 96.9%

b) 93.5%

c) 98.2%

Orangutan

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Shared DNA Quiz

Whole Class

Click your answer to find out if it's correct.

a) 94%

b) 95%

c) 98%

Gorilla

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Shared DNA Quiz

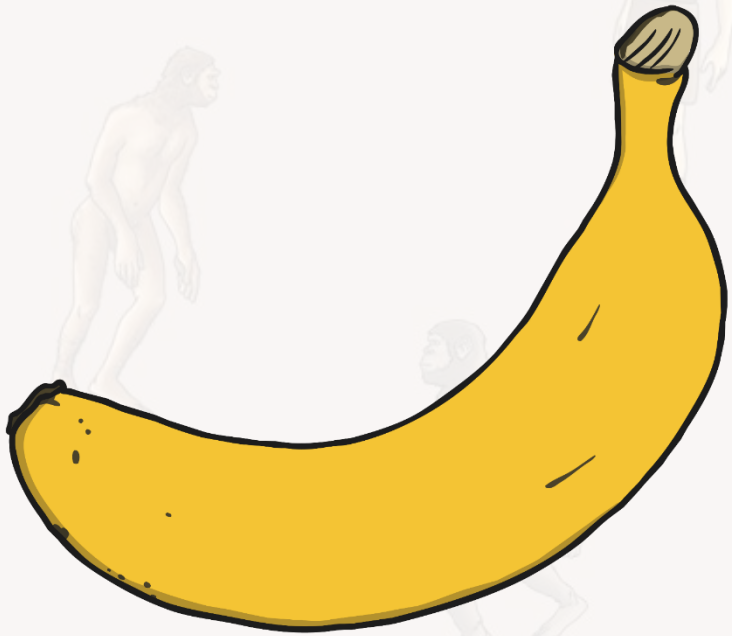
Whole Class

Click your answer to find out if it's correct.

a) 0%

b) 50%

c) 22%



Banana

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