

Evolution in the news

GCSE key words

Fossils
Evolution
Natural selection
Theory

In his marvellous travel book, *The Voyage of the Beagle* (1839), Darwin gives you a vivid picture of his experiences and you can follow him as he accumulates observations that later contributed to his theory of how evolution occurs.

Charles Darwin
as a young man



TopFoto

• Read 'Places to Visit' on page 11 to find out more about Charles Darwin.

• Follow the movement of humans as they colonised the planet at www.bradshawfoundation.com/journey

When Darwin published his theory, many people in England regarded the biblical creation story as literal truth and believed that the world was about 4000 years old.

This article looks at the evidence for evolution and considers the ongoing conflict between scientists and creationists.

Charles Darwin returned from his travels around the world on *HMS Beagle* in 1836. Over 20 years later, in 1859, he published *On the Origin of Species by means of natural selection*. The book was much in demand and the first print run was soon sold out.

Darwin was one of many people involved in the accumulation of compelling evidence that the world was a much older place than had been assumed on the basis of biblical accounts of 'creation'. However, he went further than the other gatherers of evidence for evolution and proposed a theory that described how the process of evolution might work – hence, *On the Origin of Species by means of natural selection*. Darwin's theory of evolution is as much about mechanism – how it happens – as about cataloguing evidence that it has occurred (see Box 1).

Facts and theories in science

Since Darwin's time many other scientists, both professional and enthusiastic amateurs, have added more and more evidence to support the idea of evolution as a fact. Yet some people still say 'it's just a theory'.

A theory in science is a general idea or explanation which has a lot of evidence to support it. The evidence for evolution is very wide-ranging. It includes that from the fossil record, coupled with the dating of rocks in which the fossils are found, through to evidence from comparative anatomy and adaptive radiation. There is also evidence in our proteins and in our genetic material (DNA) that reveals how humans evolved, and our relatedness to our ancestors and to other organisms. You can follow the spread of humans and their relatedness in the website listed in the margin.

We can also observe evolution taking place in the short term, in moths and antibiotic resistant bacteria, for example. The theory of evolution has been tested endlessly and it continues to stand up. That is why most scientists now accept it as a fact.

The evidence of fossils

Fossils of organisms never seen before are being discovered all the time. The initially incomplete picture of earlier life forms is being filled in steadily. Last year a new fossil showing the divergence of bees from ancestral wasps was found. Such finds make

Box 1 Darwin's theory of natural selection

Darwin proposed that natural selection is the mechanism whereby new species evolve from earlier species across millions of years. His observations and deductions can be summarised as follows:

- Observation 1: Individual organisms within a population have great reproductive potential.
- Observation 2: The number of individuals in a population usually remains approximately constant.
- Deduction 1: Many individuals fail to survive or reproduce. There is a 'struggle for existence' within a population.
- Observation 3: Variation exists within populations.
- Observation 4: Although the organism's environment can affect the extent of variation shown, variation can be inherited.
- Deduction 2: In the 'struggle for existence' those individuals showing variations that are advantageous are more likely to survive, reproduce and have more offspring, who may inherit this advantageous variation.



Pastelka/SPL

Left: Comparisons of DNA and fossil records suggest that humans and modern African apes evolved from a common ape-like ancestor

Box 2 'Truth in Science'

In September 2006 an organisation called 'Truth in Science', which believes in intelligent design and irreducible complexity, sent DVDs to all secondary schools in the UK. The origins of this organisation can be traced back to a group of the same name in the USA, where the DVDs first appeared in 2002. It is quite easy to follow the affiliation of this group on the internet back to its creationist origins.

In America, court cases have led to 'intelligent design' being banned from science lessons. In England, the creationist position and its offshoots, based in belief rather than science, are also not regarded by the Department of Education as part of science lessons.

evolutionary lineages clearer. New fossils fitting into the story of the evolution of birds have also been found recently. *Archaeopteryx* no longer sits alone between birds and reptiles.

It has also become possible to look at the available evidence and make predictions. For example, palaeontologists knew that some rocks of a particular age contained fossil organisms that they thought were descended from different fossil organisms present in older rocks. They predicted that rocks known to be of an intermediate age would contain intermediate forms. Rocks of this age occurred in the Arctic — and scientists found intermediate fossil fishes there in 2006.

Creation myths and creationists

Despite the fossil evidence, and all the other evidence in support of evolution, some people still believe in creation myths as the literal truth. They are known as

Box 3 Scientists urge evolution lessons

The world's top scientists have joined forces to call for 'evidence-based' teaching of evolution in schools.

A statement signed by 67 national science academies says evidence on the origins of life is being 'concealed, denied, or confused' in some classes. It lists key facts on evolution that 'scientific evidence has never contradicted'.

Read more, including the full statement, at: <http://news.bbc.co.uk/1/hi/sci/tech/5098608.stm>

'creationists'. They refuse to accept the scientific evidence for evolution and instead say that their creationist myth offers a proper explanation of how the world and the organisms in it came into existence.

Some creationists have put forward other ideas about 'intelligent design' or 'irreducible complexity', but these do not stand up when examined in detail against scientific evidence for evolution (see Box 2) or when the logic of the particular examples given is tested.

Today, creationists make up a small proportion of the world's Christians. Some people of other religious faiths have equivalent fundamentalist views on creation. However, most Christians now recognise that our collective knowledge and understanding has moved on since the days when the creation myth in the opening chapter of the Bible was first recorded and accepted the fact of evolution. They do not regard this as incompatible with their beliefs and wider faith.

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- Listen to a talk by Steve Jones on 'Why creationism is wrong and evolution is right' and see some of his illustrations at www.royalsoc.ac.uk/page.asp?id=4400&tip=1

Most peoples of the world have developed stories that count as creation myths, imaginative notions about how living things were 'created'.