

National Curriculum Science - Knowledge

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Key Learning

All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other.

Plants and animals have characteristics that make them suited (adapted) to their environment.



If the environment changes rapidly, some variations of a species may not suit the new environment and will die.



If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics onto their young.

Over time, these inherited characteristics become more dominant within the population.

Over a very long time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.

Vocabulary

Evolution: the process by which different kinds of living organism have changed over time.

Offspring: the young of a living thing produced via reproduction; animal or plant.

Reproduction: the production of offspring by a sexual (two parents) or asexual (one parent) process.

Variation: the differences in characteristics between individuals of the same species.

Observable: can be seen and noticed.

Characteristic: a feature or quality belonging typically to that living thing.

Suited: right or appropriate for a particular environment.

Adaptation: the process of a living thing becoming adjusted to new conditions.

Environment: the surroundings or conditions in which a person, animal, or plant lives.

Inheritance: the process of a trait being passed from parent to offspring.

Species: a group of animals that can reproduce to produce fertile offspring.

Fossil: the remains or impression of a prehistoric plant or animal embedded in rock.

Trait: an observable characteristic.

Survival: the state or fact of continuing to live or exist.

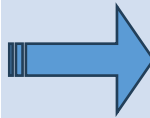
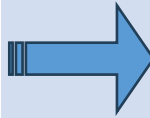
Natural selection: the process whereby organisms better adapted to their environment tend to survive and produce more offspring; regarded as be the main process that brings about evolution.

National Curriculum Science – working scientifically

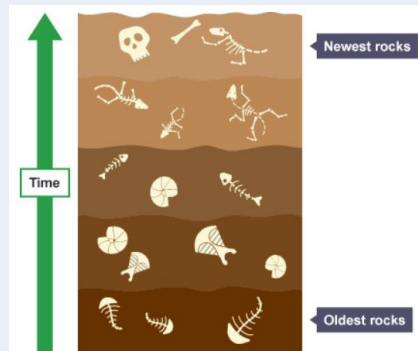
- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Key Learning continued...

Fossils give us evidence of what lived on the Earth millions of years ago and provide evidence to support the theory of evolution; by studying fossils, scientists can learn how much (or how little) organisms have changed as life developed on Earth.



Fossils provide a snap shot of the past and allow us to study how much or how little organisms have changed as life developed on Earth.



Scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics.

However, the fossil record is incomplete. There are gaps in the fossil record because many early forms of life were soft-bodied, which means that they have left few traces behind. What traces there were may have been destroyed by geological activity. This is why scientists cannot be certain about how life began.

Scientific investigations

Which shape beak is best for picking up seeds?

- Plan scientific enquiry to answer this question, identifying and managing independent, dependent and control variables, and choosing appropriate type of investigation (e.g. practical enquiry, comparative test, or fair test).
- Record and present observations in format of choice including tabular and graphical formats.
- Conclude on findings, relating them to learning about adaptation of living things to suit their environment.
- Comment on reliability of results.
- Make predictions and plan further enquiries based on these results.

Research the life and work of Mary Anning to understand her contributions to the fossil record which provides evidence in support of the theory of evolution.

Research the life and work of Charles Darwin to learn about his theory of evolution, including 'natural selection' and 'survival of the fittest'. Know his ideas are refuted by some religious groups as 'heretical'.

Key Learning: Know that living things have changed over time, that they adapt to their environment and produce offspring of the same kind.

1 How has life on Earth changed over time?

Study a timeline of life on Earth from single-cell organisms to modern-day humans to understand how life has adapted since it began and that humans have only been around for a relatively short period of time.

2 Who was Mary Anning and why is she important?

Recap how fossils are formed and learn about their importance in studying how species have adapted over time. Learn about the life and work of Mary Anning and the significance of her work in advancing this field of science.

3 What evidence do we have for evolution?

Understand the fossil evidence for evolution. Apply this understanding to examine and analyse photographs of fossils against their modern-day counterpart, identifying similarities and differences, and the reason adaptations may have given the living thing an advantage. Know that gaps in the fossil record limit our evidence for and understanding of evolution.

4 What are variation and inheritance?

Know 'trait' means an observable characteristic and 'inheritance' is a trait passed from parent to offspring. The differences in characteristics between individuals of the same species is called variation. Some variation is passed on from parents to offspring, via genes during reproduction – this is inherited variation. Some variation is the result of differences in the surroundings, or what an individual does – this is called environmental variation (e.g. scar, tattoo, hair length). Apply concept of inheritance to give desired traits in offspring.

5 How are living things adapted to suit their environments?

Understand how animals and plants have adapted to suit their environment and that these adaptations have been passed from parent to offspring via inheritance over time. Conduct research to identify and explain how living things (camel, penguin, cactus) are suited to their respective environments.

6 Who was Charles Darwin and why is he important?

& Learn about the life and work of Charles Darwin, including his 'Theory of Evolution' and 'Natural Selection'. Know that his ideas were not accepted by all at the time (or today) due to contradicting religious beliefs. Evidence has strengthened due to subsequent fossil discoveries that have 'filled in gaps' in the fossil record, and the development of genetic research.

8 Natural Selection: Which shape beak is best for picking up seeds?

Learn about the peppered moth. Conduct an experiment to determine which shape beak is best for picking up seeds. Record results then apply learning about 'survival of the fittest' to explain which birds would be best suited to this environment and therefore be more likely to survive and pass this trait onto their offspring.