

# Section 1.8: Evolution

## Evolution and Natural Selection

- The theory of evolution — life on Earth began more than 3 billion years ago as simple organisms from which all more complex organisms evolved.
  - That Charles Darwin came up with the idea of natural selection to explain how evolution occurs.
  - How natural selection works — individuals show variation, some individuals have characteristics that make them more likely to survive and breed, the genes for these characteristics are more likely to be passed onto the next generation.
  - That a change in a gene is called a mutation.
  - That a mutation may give rise to a beneficial characteristic, which helps the organism to survive and reproduce (especially if the environment changes).
  - That a beneficial mutation can accumulate in a population and lead to a change in a species.
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## Ideas About Evolution

- The reasons why Darwin's theory of evolution by natural selection wasn't accepted straight away — it went against common religious beliefs; Darwin couldn't explain how characteristics were inherited (genes wouldn't be discovered for another 50 years); there wasn't enough evidence to support his theory.
  - That there have been other hypotheses to explain how evolution occurs, including Lamarck's (which was based on the idea that 'acquired characteristics' could be inherited).
  - The reasons why scientists might come up with different hypotheses based on the same observations, e.g. religious beliefs, personal backgrounds.
  - How we came to reject Lamarck's hypothesis (experimental evidence didn't support it) and accept Darwin's (the discovery of genetics explained how characteristics could be inherited).
  - How to interpret evidence about evolutionary hypotheses.
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## Classification

- How looking at the similarities and differences between organisms allows us to classify them as plants, animals and microorganisms.
- How looking at the similarities and differences between organisms allows us to understand their evolutionary relationships.
- How evolutionary trees show common ancestors and therefore the relationships between organisms.
- How looking at the similarities and differences between organisms allows us to understand their ecological relationships, e.g. competition, predator-prey relationships.