

B2: NATURAL SELECTION (PART 1)

Learning Objectives

- × Understand Darwin's theory of evolution (everyone)
- × Understand Lamarck's theory of evolution and evaluate the differences between this theory and Darwin's (most – higher level)

Success Criteria

- × Successfully describe theories in pairs
- × Answer questions on natural selection and on Lamarck's theory (extension)

IF THESE ARE THE ANSWERS WHAT ARE THE QUESTIONS?

1. Lose heat less quickly
2. Excellent peripheral vision
3. Algae
4. Charles Darwin

SWAP BOOKS - MARK ANSWERS

- × Go through answers on the Adaptations worksheet you did on Bear Facts etc.
- × **Q1a** Polar bear • **Q1b** Thick fur or blubber for insulation; fur on the soles of its paws to insulate the paws; large body compared to its surface area, to stop it losing too much heat; small ears, to reduce the surface area from which heat can be lost • **Q1c** Eyes at front of head to judge distance; sharp claws to catch prey; sharp teeth to tear into prey; both are camouflaged so they can hide from prey • **Q1d** Forest • **Q1e** Ringed, bearded and harp seals • **Q1f** Eat fruit, roots insects and fish instead of seals • **Q1g** Poor camouflage and grip on ice • **Q2a** so they have an energy store for the winter when there is less food • **Q2b** lack of food • **Q2c** D • **Q2d** temperature change , escape predators, escape flies • **Q2e** isolated calves have more chance of being taken in a herd they are protected by the large numbers of adults • **Q3a** Warm blood entering flippers flows past cold blood leaving. This warms the cold blood so it does not cool the body • **Q3b** bacteria have enzymes that denature at temperatures above 40°C so they can live in hot places without their enzymes denaturing • **Q3c** antifreeze in plant cell stops the cell sap freezing at temperatures below 0°C.

EVOLUTION

- × Changes in animals and plants that take place over millions of years – called evolution
- × E.g. Elephant evolved from mammoth
- × When the environment changes...animals and plants need to adapt – otherwise they become extinct (like mammoth)

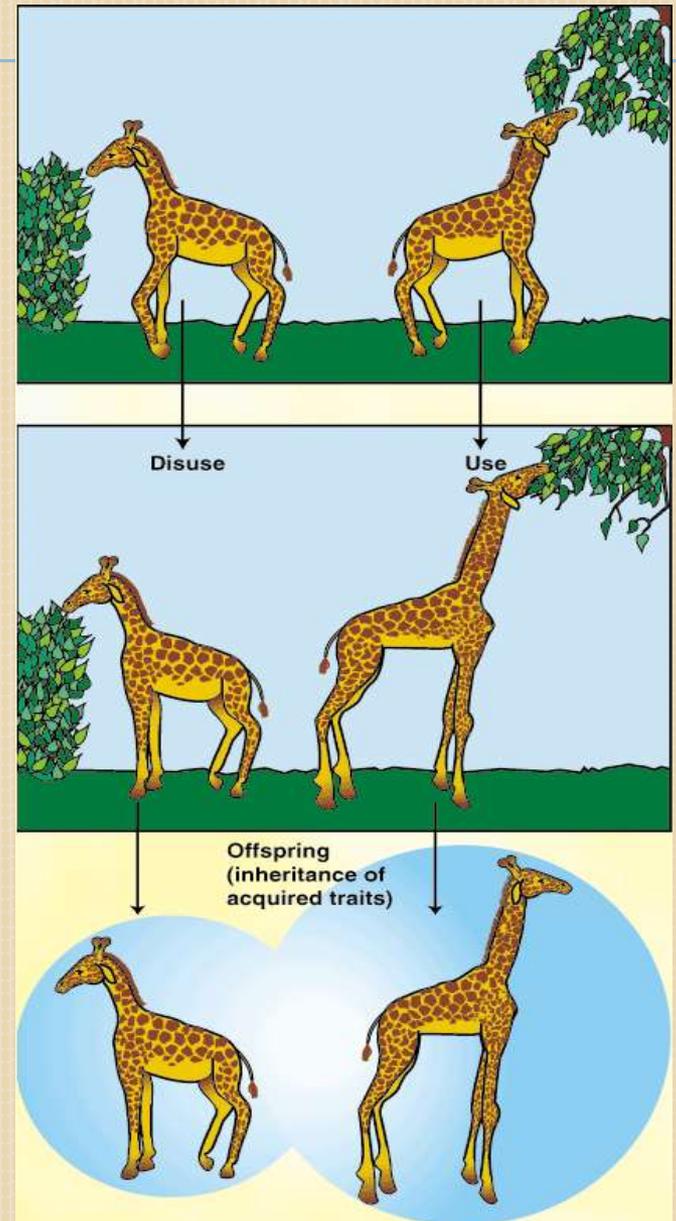
ACTIVITY

- × In pairs – number yourselves 1 and 2 (foundation people should be no. 1s)
- × **Number ones** – Read book chapter on Darwin's theory of natural selection – write down 6 key points
- × **Number twos** – read slide on board about Lamarck's theory of evolution – write down 6 key points
- × You have 5 minutes only – work in SILENCE
- × You will then discuss with your pair what you have found out. Make notes on what you learn from your buddy.

LAMARCK'S THEORY OF EVOLUTION

Higher Only

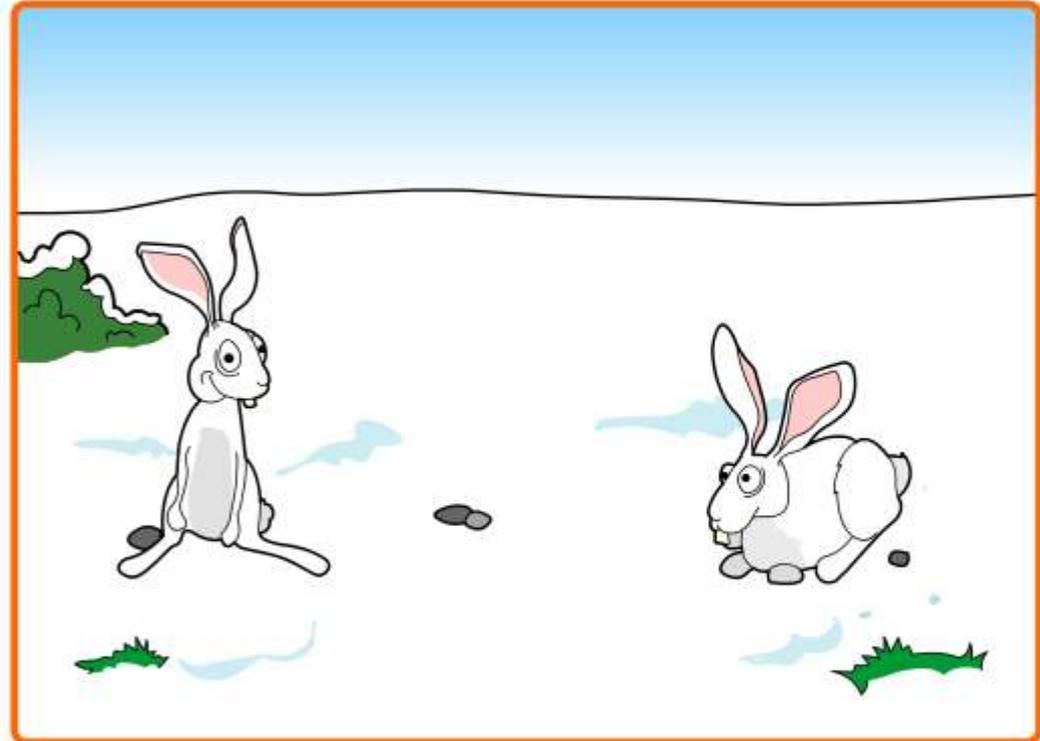
- ✘ Lamarck came up with the **Law of Acquired Characteristics**
- ✘ He said that change is made by what the organisms want or need
- ✘ Lamarck believed that the giraffe evolved its long neck by stretching for food and this then got passed on to offspring
- ✘ This theory has been discredited





What is natural selection?

Darwin's theory of natural selection (often called '**survival of the fittest**') is based on the fact that **natural variation** among organisms causes them to differ in their ability to survive and reproduce. Click "**start**" to find out what happens.



?

start



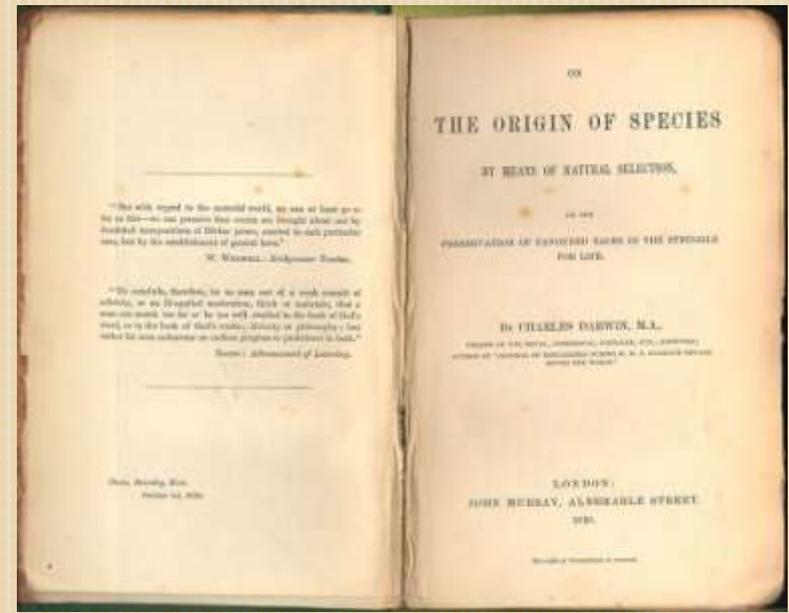
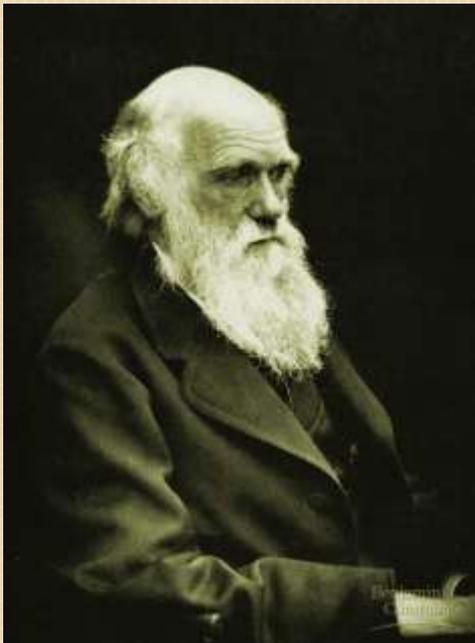
DARWIN'S THEORY: NATURAL SELECTION

- ✘ If you're better adapted to your environment you are more likely to survive
- ✘ "Survival of the fittest"



CHARLES DARWIN

- × 12th February 1809 – 19th April 1882
- × Darwin was an English naturalist who achieved lasting fame by producing considerable evidence that species originated through evolutionary change, at the same time proposing the scientific theory that natural selection is the mechanism by which such change occurs.



DARWIN'S THEORY OF EVOLUTION BY NATURAL SELECTION

× Presence of natural variation



× Competition for limited resources e.g. food

× 'Survival of the fittest' (best adapted will survive)

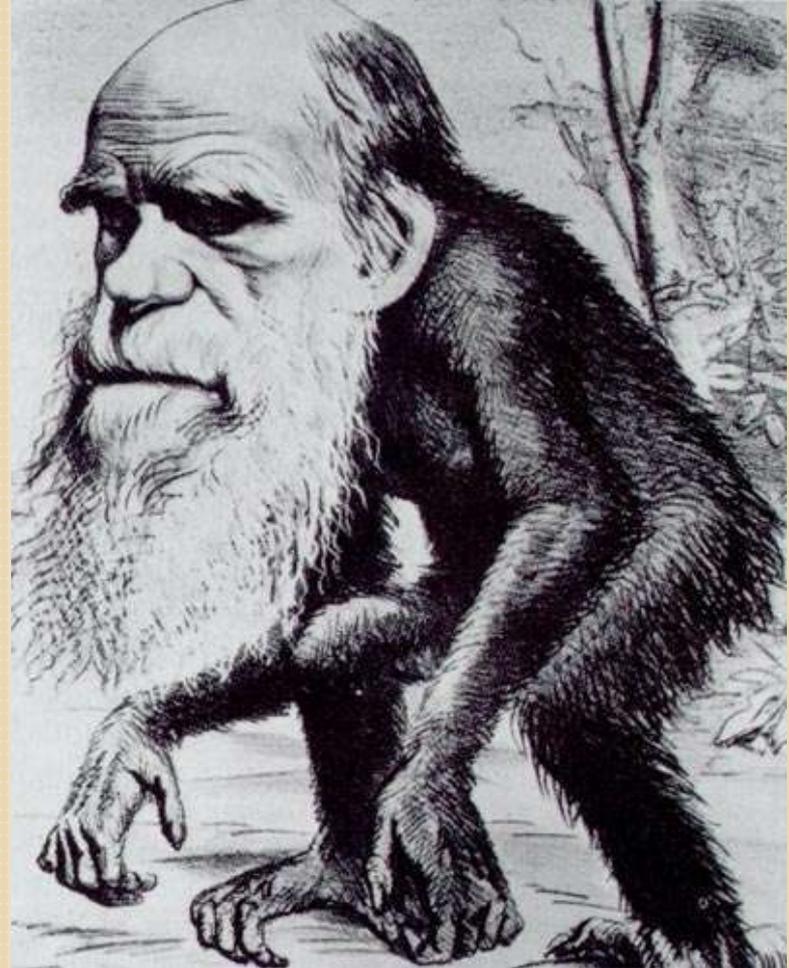
× Genetic inheritance of 'successful' adaptations

× Extinction of species unable to compete

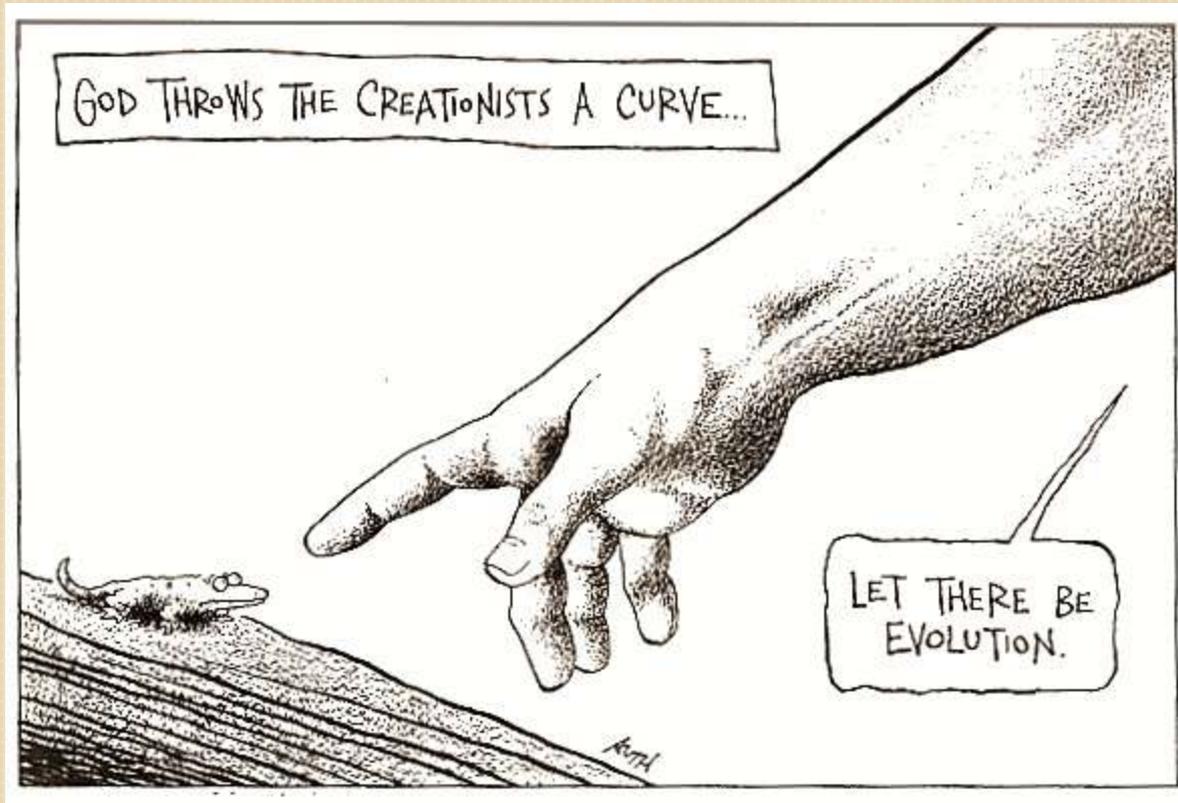


SOCIAL & HISTORICAL CONTEXT

- × Newspapers parodied the 'men from monkeys' idea
- × Church condemned ideas
- × Some people thought he didn't have enough evidence



DARWIN'S THEORY HAS NOT BEEN PROVEN



- ✘ However some things help support the argument e.g. Fossils (have shown horse-like animals with 5 toes) and DNA

EVOLUTION OR DESIGN?

Some people reject evolution and natural selection in favour of alternative explanations such as **intelligent design** (ID).

According to ID, organisms are too complex to have arisen by evolution alone, and their development must have been guided by a higher intelligence at some point.

Supporters of ID claim it is a valid theory based on scientific evidence, but critics say it is simply a disguised version of **creationism**.

What do you think about teaching intelligent design in a science class?



QUESTIONS

1. Suggest one way in which penguins are adapted to the cold.
2. Use Darwin's theory of natural selection to explain how MRSA* has evolved.
3. Explain how Darwin's theory of evolution differs from that of Lamarck (Higher only)
4. Evaluate the evidence for Darwin's and for Lamarck's theories. Which one is most accepted?
5. Imagine it is 1836 and Darwin's theory has just been written. Write a "press release" of approximately 10 lines explaining the theory, and arguments for and against. Include some information on resistance from people who do not accept the theory because it does not match Christian teachings. Be careful of spelling and grammar (remember you are writing it to an audience of newspaper readers).

ANSWERS

1. Feathers or layer of fat to keep them warm
2. Survival of fittest (those whose genes already give them resistance) – strain reproduces while others die off
3. Darwin suggested organisms passed on the adaptations they were born with. Lamarck suggested they acquired the adaptations during their lifetime.
4. Many scientists have discussed and tested Darwin's theory and it explains changes seen in fossils. New information about DNA and genes support Darwin's theory and show that Lamarck is not correct.

QUESTIONS- FOUNDATION

1. Give two reasons why a penguin that swims faster has more chance of surviving.
2. How is the colour of a peppered moth passed on to its offspring?
3. Suggest one reason why warfarin resistance in rats is a problem to humans.
4. Why do you think it is important to finish a course of antibiotics?

ANSWERS - FOUNDATION

1. Catch more fish, escape from predators
2. Through its genes
3. Means that they could invade homes and it would be difficult to get rid of them
4. To kill off the stronger strains so that they do not evolve resistance

Match the definition to the correct key word then sequence the four stages to outline the process of natural selection

All living things in a species are not the same.

competition

They are more likely to reproduce. The offspring will inherit the environmentally favoured feature.

survival

Some individuals have features which help them survive.

variation

There is not enough food or space for all of them.

reproduction

Natural Selection (answer)

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