Edexcel Biology GCSE

Topics 4.1B to 4.6B - Evolution

Flashcards

What is evolution?

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- A gradual change in the inherited traits within a population over time
- Occurs due to natural selection

Outline the theory of natural selection

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1. Genetic variation exists due to spontaneous mutations
2. Selection pressures (e.g. competition, disease) exist
3. Random mutation gives an organism a selective advantage
4. Organism is better adapted to the environment and survives
5. Organism reproduces, passing on its beneficial alleles
6. Frequency of advantageous alleles increase

Why does competition between organisms in a habitat exist?

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The resources within a habitat required for survival are limited

Give some examples of competition between organisms within a habitat

Give some examples of competition between organisms within a habitat

Competition between animals for food, shelter, mates etc.

Competition between plants for light, water, minerals etc.

Describe how antibiotic resistance in bacteria can be used as an example to illustrate the process of evolution

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1. Genetic variation exists due to spontaneous mutations
2. Antibiotics act as a selection pressure
3. Mutations gives a bacterium antibiotic-resistance
4. If an antibiotic is administered, the bacterium is better adapted and survives, whilst other bacteria are killed
5. Bacterium reproduces, passing on its resistant variant
6. Frequency of antibiotic-resistant allele increases

Why is the development of antibiotic resistance in bacteria a good study for evolution?

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Bacteria reproduce very rapidly, allowing the first-hand observation of evolution

How can the observation of fossils provide evidence for evolution?

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- Older fossils (found in rocks deeper in the ground) contain simpler organisms. Newer fossils (found closer to the surface) contain more complex organisms. Comparisons of fossils show that simple organisms evolved into more complex life forms.
- Fossils can be organised into chronological order, allowing the changes in organisms over time to be observed

Describe the role of Darwin in the development of the theory of evolution by natural selection (biology only)

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- Studied a variety of organisms whilst travelling around the world on the HMS beagle
- Noted that traits can be passed from parents to offspring
- Proposed the idea of ‘survival of the fittest’
- Established the theory of natural selection and published his ideas in ‘On the Origin of Species’

Describe the role of Wallace in the development of the theory of evolution by natural selection (biology only)

Describe the role of Wallace in the development of the theory of evolution by natural selection (biology only)

- He proposed a theory of natural selection that was similar to Darwin's, although the mechanisms were different
- He gathered greater evidence (e.g. studying warning colouration in butterflies) to support the theory

How has the theory of evolution by natural selection impacted modern biology and society? (biology only)

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- Enables the classification of organisms into taxa
- Influences modern medicine by emphasising the importance of finishing antibiotic treatments and the need for the constant production of new antibiotics
- Highlights the importance of high genetic diversity in habitats which aids conservation projects

What fossils have provided evidence for human evolution? (3)

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- ‘Ardi’ - 4.4 million years old
- ‘Lucy’ - 3.2 million years old
- Leakey discovered 1.6 million year old fossils

What clues does ‘Ardi’ give scientists about human evolution?

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Female hominid fossil. She shows phenotypic traits which encompass characteristics of both humans and apes:

- Ape-like characteristics e.g. long arms, large big toes
- Human-like characteristics e.g. the structure of her bones suggests that she walked upright

What clues does ‘Lucy’ give scientists about human evolution?

What clues does ‘Lucy’ give scientists about human evolution?

Female hominid fossil. She shows phenotypic traits which are more human-like than that of ‘Ardi’:

- The structure of bones in her legs and feet are more adapted to walking than climbing
- However, her brain size is closer to that of an ape’s

How did Leakey’s findings provide evidence for human evolution?

How did Leakey’s findings provide evidence for human evolution?

He discovered many hominid fossils.

The 1.6 million year old fossil ‘Turkana Boy’ showed traits comparable to that of modern-day humans e.g. similar brain size.

How has the development of stone tools provided evidence for evolution?

How has the development of stone tools provided evidence for evolution?

- Correlation between the development of more complex tools and an increase in brain size
- Primitive tools are older than more complex tools. Brain size has increased over time ∴ as brain size increased, advancements in tool use were made.

Describe the methods used by scientists to date tools

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- **Carbon-14 dating** - estimating the age of carbon-containing material that is found in tools (e.g. wooden handles) or alongside tools (e.g. fur)

- **Stratigraphy** - using the age of the layers of sediment surrounding the tool as an indication of the age of the tool

What is a pentadactyl limb?
(biology only)

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A limb with five digits present in animals, bird, reptiles and amphibians

How does the pentadactyl limb provide evidence for evolution? (biology only)

How does the pentadactyl limb provide evidence for evolution? (biology only)

The presence of the pentadactyl limb suggests that all species which possess it have descended from a common ancestor.