Extinction

BIOLOGY • ADAPTATION AND EVOLUTION • EXTINCTION

Section 1: Extinction

• What is extinction?

When all the members of a species no longer exist on the planet we say the species has become extinct. Extinction has been a normal ongoing process since life first emerged on Earth about 3.5 billion years ago. Extinction continues to happen day after day, year after year. In addition, many species today are said to be endangered. This means that their numbers are low and they are at risk of becoming extinct.

• Suggested Film

- Extinction

Extension Question

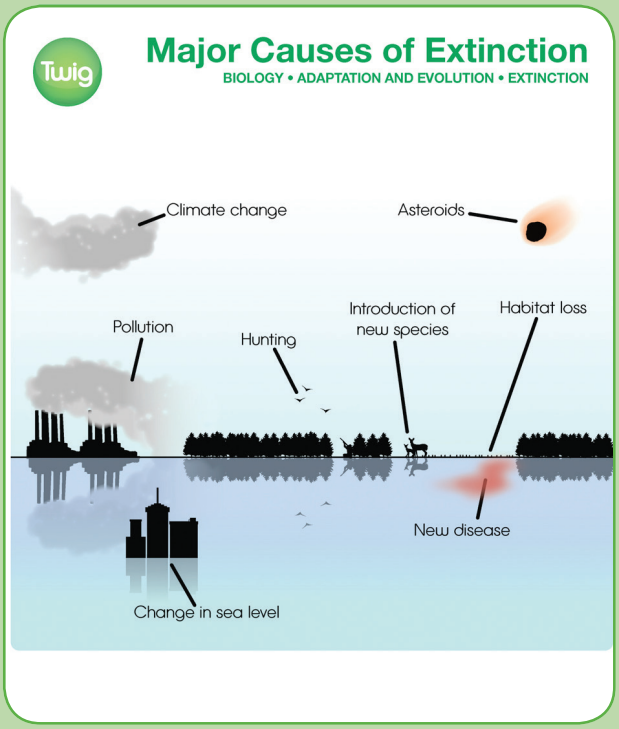
Q1. What is a species?

A species is a population of organisms capable of interbreeding to create fertile offspring. Members of the species show similarities in their genetics, behaviour and appearance.

So, for example, cheetahs are a species of big cat. They look very similar to each other and are able to interbreed. Lions are a different species of big cat. They can breed with one another but they are unable to breed with cheetahs.

• Why do species become extinct?

DIAGRAM 01:



A huge range of factors can cause a species to become extinct. Abiotic factors such as climate change, volcanic activity and fire can destroy a species, as can biotic factors such as habitat destruction, disease and predation. The activity of humans is also having a dramatic impact on the diversity of life on Earth. Activities such as hunting, overfishing and deforestation are causing species to become extinct every day, as well as placing many organisms on the endangered list.

• Suggested Films

- Endangered Species

- FactPack: Endangered Species

Extension Question

Q2. What is an endangered species?

Endangered species are those species which are at risk of becoming extinct. The International Union for the Conservation of Nature (IUCN) maintains a 'red list' detailing those species at risk of extinction. Species are categorised according to how vulnerable they are.

• How common is extinction?

Extinction is a natural process caused when a species is unable to adapt quickly enough to changing conditions. It is not a rare event and it is estimated that 99% of all species that have ever existed have gone extinct! Of course when species go extinct it changes the ecosystem and provides the opportunity for other species to evolve and occupy new niches.

Habitat destruction can lead to extinction of species

• Suggested Film

- **Extinction**
- **Tasmanian Devil**

Extension Question

Q3. What is an ecosystem?

An ecosystem is a self-sustaining system of living organisms, which interact with each other and with the non-living components of the environment. A tropical rainforest can be described as an ecosystem. The living components of an ecosystem are called 'biotic' factors and include all the plants and animals and the relationships between them. The non-living components such as the air, soil, rocks and water are the 'abiotic' factors.

Section 2: Mass Extinction

• What is a mass extinction?

A mass extinction is an event when huge numbers of species go extinct in a relatively short period of evolutionary time. Major, global events, such as meteorite strikes or climate change, probably need to occur for mass extinctions to take place and many believe that the current destructive activity of humans is causing mass extinction.

The disappearance of the dinosaurs about 65 million years ago is regarded as a mass extinction, and opinions differ as to its cause. Some believe it was due to a cataclysmic meteorite strike, whilst others believe it was a more gradual event, possibly caused by volcanic activity and climate change over several million years.

• Suggested Film

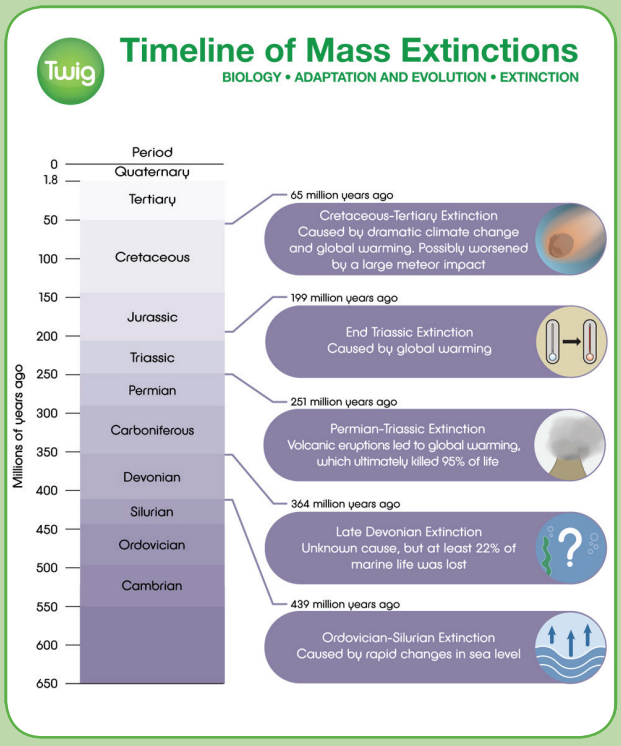
- **Mass Extinction: Dinosaurs**

Extension Question

Q4. How long were the dinosaurs present on Earth?

The fossil record suggests that dinosaurs roamed the Earth for about 150 million years. The dinosaurs were a diverse group of animals, but the earliest dinosaur fossils suggest they first appeared on Earth about 215 million years ago and they went extinct about 65 million years ago.

DIAGRAM 02:



• Are mass extinctions common?

One theory as to why dinosaurs became extinct is that there was a massive meteor strike

Although species go extinct every day, true mass extinctions are relatively rare. In fact, scientists recognise only five true mass extinctions since life began on Earth about 3.5 billion years ago. That said, many believe we are currently living through the sixth mass extinction, probably caused largely by the activity of humans. Certainly, many scientists have recorded a massive loss of biodiversity in the global ecosystems and warn of the dire consequences which may result.

• Suggested Film

- A History of Mass Extinctions

Extension Question

Q5. What is biodiversity?

Biodiversity refers to both the number of organisms and the number of different types of organisms in an ecosystem. Ecosystems that sustain both lots of organisms and lots of different species are said to have high biodiversity. Biodiversity is vital to humans as it provides us with food, materials, and medicines. It also has important implications for our atmosphere, soil and water. Furthermore, genetic variations within species can prove to be important in future breeding programmes. As a result it is crucial we maintain this biodiversity.

• What are the implications of mass extinctions?

Any extinction, and especially mass extinctions, cause dramatic changes to the way ecosystems function. Both biotic and abiotic factors are shifted dramatically and this can cause further extinctions if species are unable to evolve quickly enough to adapt. Of course the removal of species from ecosystems also presents opportunities for surviving species, and provides opportunities for new species to evolve to fill new niches.

Extension Question

Q6. What is a niche?

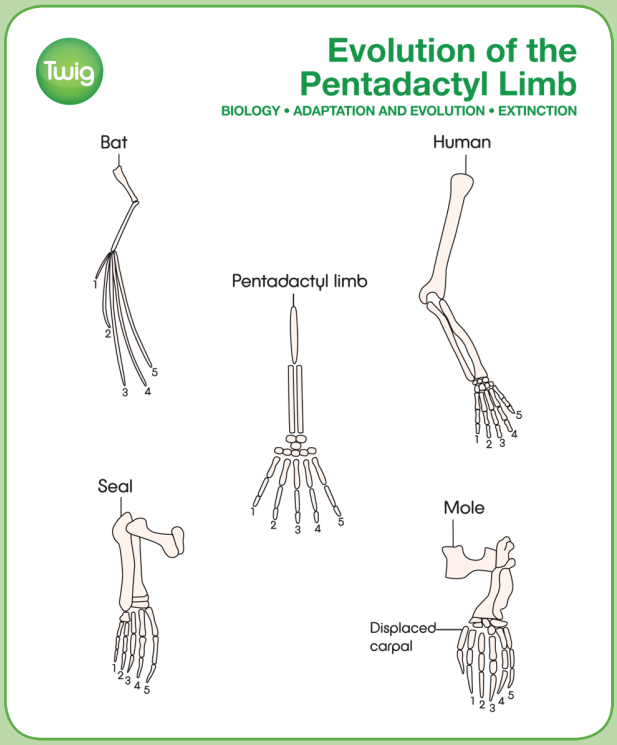
A niche is the role that an organism has within an ecosystem. It refers to every aspect of an organism's involvement within an ecosystem, both in terms of its physical position and its interactions with other organisms, such as what it feeds on and what feeds on it. Members of the same species occupy the same niche in an ecosystem, because they play the same role when they interact with both the biotic and abiotic components.

Section 3: Fossil Evidence

• How do we know about extinction?

Palaeontologists are scientists who study fossils. Fossils are the remains of organisms that lived thousands or millions of years ago, and they can be dated to provide evidence about when different types of creatures lived on Earth. Where fossils are found can help us date them, with those found in lower layers of rock being older than those nearer the surface.

DIAGRAM 03:



Palaeontologists are scientists who study fossils

- **Suggested Film**
  - **Fossil Evidence**

Extension Question

Q7. How are fossils formed?

Fossils are formed when dead organisms are not decayed, but instead become covered in silt or sand and so are preserved. Over time the tissues are slowly replaced by minerals and the organism turns into a rock, thereby preserving its shape and body features.

• What information can be obtained from fossils?

Fossils can provide us with all sorts of useful information that helps us build a picture of how life on Earth has changed over time. Dating fossils allows us to estimate when new species emerged and others went extinct. Gradual changes in fossils can help us to piece together possible evolutionary changes, which in turn might help us to understand better the conditions on the planet many millions of years ago. We can understand how species may have lived and how they may have interacted with one another and their physical environment.

- **Suggested Film**
  - **Big Al**

Extension Question

Q8. What is evolution?

Evolution is the process by which species can change and adapt over time. It is also the process by which new species are formed from pre-existing ones. For example, over time a population of organisms may change to become better adapted to its conditions. They may become resistant to disease or better camouflaged. In some cases, a population may change so much that it becomes a different species.

Fossils are the remains of organisms and they can provide information about the Earth's past

• Quizzes

Extinction

Basic

• What term is used to describe a species which no longer exists?

A – endangered
B – evolved
C – extinct
D – adapted

• What percentage of species are believed to have gone extinct since life emerged on Earth?

A – 50%
B – 75%
C – 90%
D – 99%

• Which species is thought to be the cause of mass extinction of species at the moment?

A – bacteria
B – humans
C – the rainforest
D – viruses

Advanced

• What percentage of species are believed to have gone extinct since life emerged on Earth?

A – 50%
B – 75%
C – 90%
D – 99%

• On average, how long does a species exist before it becomes extinct?

A – 1000 years
B – 100,000 years
C – 1 million years
D – 4 million years

• Which of the following could not cause a species to go extinct?

A – climate change
B – new predators
C – death of competitors
D – new disease

Fossil Evidence

Basic

• What is the name given to scientists who study fossils?

A – geologists

B – mineralogists

C – pianists

D – palaeontologists

• What are fossils?

A – bones

B – dead animals

C – mineralised remains of organisms

D – rotting organisms

• What age are fossils found in lower layers of rock thought to be?

A – older than fossils found nearer the surface

B – younger than fossils found nearer the surface

C – 10 years

D – 100 years

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• Answers

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