Competition

What is competition?

Symbiosis

Predator-prey relationships

Summary activities
What is competition?

All living things need natural resources, but the problem is that there is not enough for everyone. This means that individuals have to fight for them in order to survive.

This struggle for resources is called competition.
Competition occurs between members of different species. This is called **interspecific competition**.

Competition also occurs between members of the same species. This is called **intraspecific competition**.
There are four resources for which animals compete. What are they?

- food
- water
- mates
- land (territory)

Which resource is not relevant for interspecific competition?

Members of different species will not compete for mates.
What do plants compete for?

Competition between plants may be less noticeable than competition between animals but it still takes place. What four things do plants compete for?

- light
- water
- minerals
- space
Competition in the meadow

Growth of grass in a meadow is affected by light, water, shade and sheep.

Click "start" to investigate how competition between these four factors affects the meadow.
Structure of the environment

The environment is made of many different types of ecosystems, such as seashores, forests, lakes and deserts.

Each ecosystem can be divided into a:

- **habitat** – the non-living (abiotic) part, i.e. the physical area in which organisms live

- **community** – the living (biotic) part, i.e. all the different organisms living in that particular habitat.

Each community is made up of many different populations. A **population** is all the members of a particular species living in one habitat – for example, the population of red squirrels in an oak wood.
What are niches?

Each species within an ecosystem has its own **niche**. This is the role the species plays in the ecosystem – where it lives, what it eats, etc.

- **Specialists** are species that have a **narrow** niche. They may only be able to survive in very specific environmental conditions and have a very limited diet. Examples include anteaters and koalas.

- **Generalists** are species that have a **broad** niche. They can live in a wide-range of environmental conditions and eat many different types of food. An example is the crow.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>ecosystem</td>
<td>the non-living part of an ecosystem</td>
</tr>
<tr>
<td>habitat</td>
<td>the role of one species within an ecosystem</td>
</tr>
<tr>
<td>community</td>
<td>all members of one species in an ecosystem</td>
</tr>
<tr>
<td>population</td>
<td>the living and non-living parts of a specific area</td>
</tr>
<tr>
<td>niche</td>
<td>all populations of all organisms in an ecosystem</td>
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</tbody>
</table>
The more similar two species are, the more similar their niches will be. What happens when niches overlap?

Species with overlapping niches will **compete** for resources. The greater the overlap between niches, the greater the competition between the species.

- Many specialists can live together in the same ecosystem because they are much less likely to compete.
- Generalists will compete much more and so there will be fewer of these species within one ecosystem.
- Members of the same species have exactly the same niche and so they must compete for everything.
Competition results in winners and losers.

Winners obviously benefit from gaining resources, but what happens to the losers?

Individuals and species that are less competitive are at risk of dying out because they will struggle to gain resources.

This means that competition is driving force behind natural selection and evolution. Individuals with genes that make them more competitive are more likely to survive and pass on those genes.

How can a less competitive species avoid extinction?

- adopt new survival strategies
- move to an area where there is less competition.
Competition and population size

The size of a population varies due to factors such as disease, migration and predation.

Intraspecific competition generally has a **stabilizing effect** on a population. Why is this?
Decline of the red squirrel

The red squirrel is a native species of the British Isles, living in coniferous and broadleaf woodlands.

Red squirrels were once widespread throughout the British Isles but in the last 50-60 years, their numbers have dramatically declined and they are now absent from many areas.

Small, isolated populations exist on the Isle of Wight, Wales and central England. They are still widespread in the North of England and Scotland.

What has caused the decline of the red squirrel?
Why have red squirrels declined?

The destruction of red squirrels’ natural habitat has contributed to their decline but the major reason is because of competition from the grey squirrel.

The grey squirrel is not native to the British Isles but was introduced from North America towards the end of the 20th century. It is larger and more aggressive than the red squirrel.

It is not clear exactly how grey squirrels have caused the decline of red squirrels but scientists think that greys are more successful in foraging for food than reds.
Complete these sentences about competition

1. Competition is the struggle between organisms for __________.

2. Animals compete for food, water, ___________ and territory.

3. Plants compete for food, water, ___________ and space.

Options:
- niches
- mates
- species
- more
- evolution
- resources
- light
- less
- habitats
- extinct
- hide
- solve
Competition

Contents

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- Summary activities
Symbiosis occurs when two organisms of different species
live together in a very close relationship.

There are different types of symbiosis depending on how
each organism benefits or not from the relationship. The two
most well-known types are:

- **parasitism** – one species benefits at the expense of
  the other species
- **mutualism** – both species benefit.

Can you think of any examples of these kinds of symbiosis?
What is parasitism?

Parasitism occurs when an organism (the **parasite**) lives on or in another organism (the **host**) at the expense of the host.

For example, ticks and fleas are tiny insects that live on larger animals, such as dogs and other mammals. They feed by piercing the host’s skin and drinking their blood.

This can cause illness and, if the insect carries pathogens, diseases too.
Adaptations of a tapeworm

Tapeworms are long, ribbon-like worms that live inside a host’s gut. How are they adapted to life as a parasite?

- **Body**
  - Covered by mucus to protect against host’s digestive juices

- **Head**
  - Has hooks and suckers to hold onto the gut wall

- **Body**
  - Long, thin body gives large surface areas for absorbing food

- **No digestive system** needed as food has already been digested
Nitrogenous plants

Sometimes, different species don’t compete with one another but actually co-operate. This is called mutualism.

Leguminous plants such as peas and beans live in a mutualistic relationship with nitrogen-fixing bacteria.

The bacteria live in root nodules of the plant, where they convert atmospheric nitrogen into nitrates. These are used by the plants for growth.

In return, the bacteria receive sugars from the plant as a source of carbon and energy.
A helping hand?

The **oxpecker** bird is a type of African starling that eats ticks, fleas and other insects attached to large mammals such as buffalo and rhinoceros.

The oxpecker is a type of **cleaner species**.

The oxpecker benefits from a source of food while the mammal is cleaned of parasites that feed on its blood.

However, oxpeckers are also known to consume a host’s blood and wound tissue, which makes them partly parasitic!
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A **predator** is an animal that hunts and kills other animal for food. The animal that is eaten is the **prey**.

For example, lynxes are a type of wild cat that hunt snowshoe hares in northern parts of North America.

The size of the two populations are very closely linked. Why do you think this is?
How are predator and prey populations linked?

Year:
1845 1855 1865 1875 1885 1895 1905 1915 1925 1925

Hare population
Lynx population
Prey population changes

The hare population follows a cyclical pattern, where it rises and falls in a fairly regular cycle. Why is this?

The hare population changes due to both the vegetation growing season and changes in the lynx population.

Individual hares must compete for food and mates, and must also avoid being killed by lynxes, their predators.
The lynx population also follows a cyclical pattern very similar to the hare population. Why is this?

The lynx is very dependent on hares for food, so as the hare population changes so does the lynx population.

This is why the lynx population rises and falls slightly after the rise and fall of the hare population.
Predator-prey cycles

Predator-prey population cycles

Why do predator-prey population changes occur in cycles?

Click "start" to find out.
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• **community** – All the different types of organisms within an ecosystem.

• **competition** – The struggle for resources between individuals of the same or different species.

• **ecosystem** – A specific type of environment and all the organisms living within it.

• **generalist** – An organism that has a wide niche and can survive in a range of environmental conditions.

• **habitat** – The physical, non-living part of an ecosystem.
• **niche** – The position that an organism occupies in an ecosystem.

• **population** – The number of one particular species within a specific area.

• **predator** – An animal that hunts and kills other animals for food.

• **prey** – An animal that is killed and eaten by another animal.

• **specialist** – An organism that has a narrow niche and can only survive in specific environmental conditions.
Anagrams

How quickly can you unscramble anagrams of words about

c o m p e t i t i o n ?

start
Multiple-choice quiz

It's time to face the competition!

start