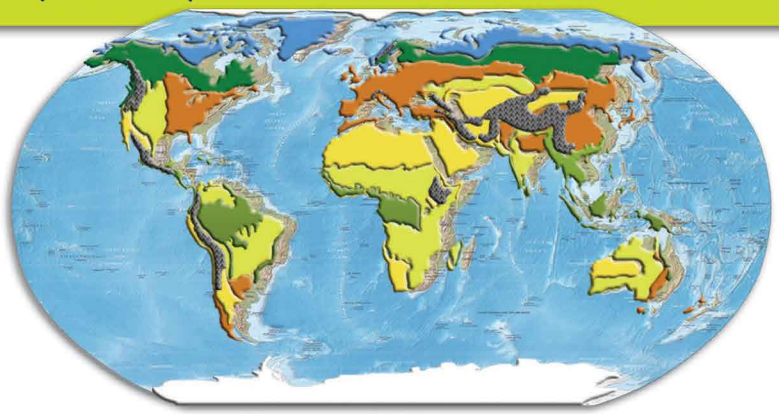
HABITATS & ADAPTATIONS

What is a habitat?

Organisms live in a variety of environments and each one is called a habitat. Habitats can be on land or in the water and each has its own environmental characteristics in terms of climate and geology. They can be large or small (e.g. a forest or under a rock); small habitats are known as micro-habitats. Many of the world's biggest habitats are aquatic e.g. oceans,coral reefs and freshwater, but this brochure concentrates on terrestrial habitats. Major terrestrial habitats are tropical forest, coniferous forest, deciduous forest, grassland, desert, tundra, polar and montane (mountains).

Where are different habitats found?



MAP KEY

Coniferous Forest | Tropical Rainforest | Temperate Forest | Grassland | Desert | Montane | Tundra | Polar

Most well known are **tropical rainforests**. These are located around the equator and have a minimum rainfall of 150mm per year, an average temperature of 25-30°C and 12 hours of sunshine every day, creating a very warm, humid, dense forest with the largest number of species of any habitat. Also tropical dry forests (deciduous), tropical coniferous forests and coastal mangrove forests.

Covers a vast area of northern Europe, Russia, Alaska and Canada. Typified by long, cold winters and short cool summers, these areas have short growing seasons and low to moderate rainfall. Mainly mosses and lichens grow on the ground. The harsh conditions of winter mean that a lot of animals found here hibernate or migrate south.

Deserts are typified by less than 250mm of rainfall per year, together with major temperature extremes, sometimes reaching over 50°C during the day and falling below freezing at night. These conditions mean that little vegetation grows in the desert and plants growing here are adapted to minimise water loss (e.g. cacti).

Contain mostly broad-leaf deciduous trees (lose their leaves in winter), sometimes with a mixture of evergreens. Have a high annual rainfall, warm summers and freezing winters. There are several vegetation layers for animals to live in. Temperate deciduous forests can be found in North America, Europe and parts of Asia. In warmer Mediterranean-type climates, species rich scrub forests also exist.

North of the boreal coniferous forests there are vast areas of tundra. Here the summers are short and winters are cold and dry. The permanently frozen subsoil (permafrost) and short growing season means that mosses, lichens, grasses and low bushes are dominant (no trees). Many birds (e.g. geese) nest in here in summer. The polar regions support very little life due to the extreme low temperatures and lack of vegetation.

Characterised by hot dry summers and cool springs with sparse rainfall, this type of habitat provides ideal conditions for perennial grasses and herbaceous species but not enough rainfall for substantial tree growth. Grasslands once covered 40% of the earth's land surface but today, due to development and farming, now only cover 20%.

Just as habitats change with latitude they also change with altitude. Near the equator, trees can be found on mountain slopes but often they are covered in grasslands, nearer the summit they are often barren supporting few animals. Higher up a mountain the air temperature drops (by about 10°C for every 200m), oxygen is less abundant and sunlight becomes intense. Temperate regions (e.g. Alpine) are seasonal causing an increase of life in spring and summer.

What is an adaptation?

Adaptations are any physical trait or behavioural characteristic that makes it easier for an animal to survive in a certain environment. Adaptations can include changing appearance, a modified life cycle or specialist body function.

Examples of adaptive behaviours are migration, hibernation and changing diet.

Generally adaptations (especially physiological changes) evolve over huge periods of time and enable animals to adapt to slow changes in their environment. If sudden environmental changes occur and the animal cannot adapt, they may become extinct.

Animal physiology

Examples of adaptive physiology can be seen in many animals. Some can be seen throughout a class e.g. all birds have wings and feathers. Feathers are made from keratin, just like mammalian hair and reptilian scales. Different feathers have different functions, some are long and stiff for flying whilst others are short and fluffy for insulation.

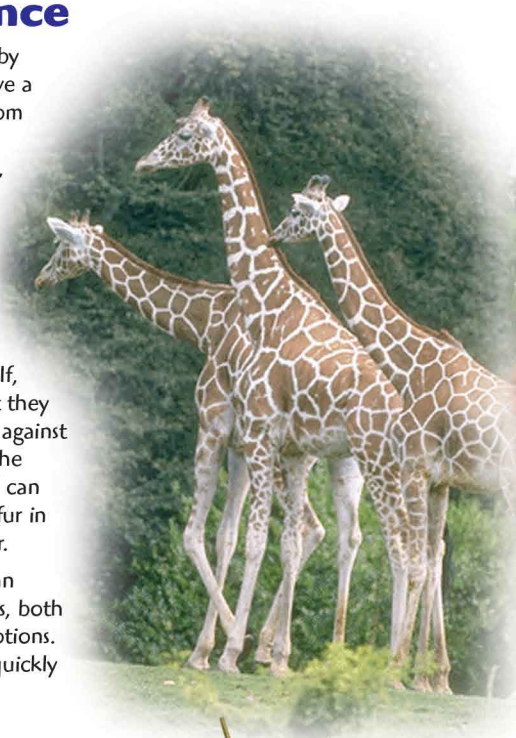
Birds have strong wing muscles that are connected to a keel (projection) on their breastbone, and to reduce weight, have thin, hollow bones which are strengthened by internal struts. Birds are unique in having a beak and this is adapted to their diet e.g. breaking seeds, probing mud, spearing fish or tearing flesh. Most birds also have an excellent sense of sight and good hearing.

Changing appearance

Some animals adapt to their environment by changing their appearance. This may involve a change in shape, size or colour. Animals from cold climates often have shorter limbs and appendages than those from hot countries, to minimise surface area and heat loss. Animals that live in water for a large part of their life are nearly always streamlined (e.g. seals, fish and penguins).

Changing colour can have many purposes including camouflage, as a warning, or for recognition by others of the same species. If, the animal lives in a constant environment they tend to stay the same colour - polar bears against snow, lions against savannah. However, if the environment changes it helps if the animal can too, such as the Arctic fox which has dark fur in the summer and a white coat in the winter.

Whilst humans go red when embarrassed, an octopus can change many different colours, both for camouuflage and to communicate emotions. Chameleons can also change colour very quickly for camouflage and communication.



Life cycles

Many animals time the birth of their offspring to an abundance of food e.g. great tit chicks hatch in time for a plentiful supply of caterpillars.

Desert locusts live a solitary life until it rains causing vegetation to grow and enabling females to lay their eggs in the soil. The vegetation provides food and shelter for the newly hatched hoppers. Close contact between the hoppers causes metabolic and behavioural changes which causes them to change into a gregarious phase. They change colour and release pheromones which attracts each other, hence they swarm and can cause immense damage.

Camels - extremely well adapted to deserts

Both dromedary and bactrian camels live in the desert and are extremely well adapted to this specialist habitat.

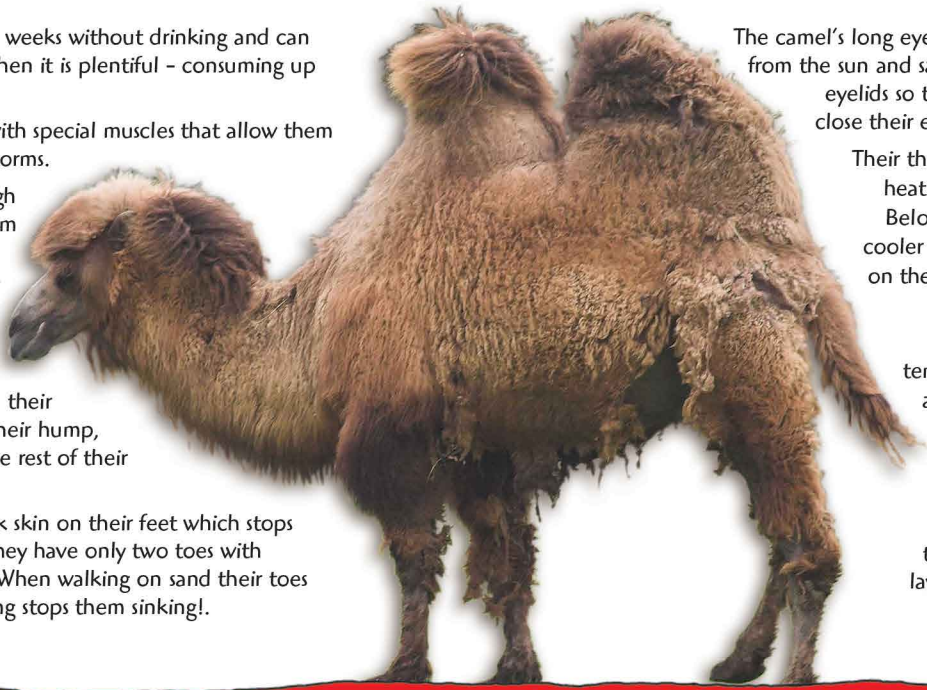
Camels can survive for weeks without drinking and can drink extremely fast when it is plentiful - consuming up to 57 litres at a time.

Camels have nostrils with special muscles that allow them to close during sand storms.

Camels have very tough mouths that allow them to eat thorny plants.

When food is plentiful a camel will eat more than is needed and stores the surplus as fat. Camels keep all their fat in one place - in their hump, and this helps keep the rest of their body cooler.

Camels have very thick skin on their feet which stops them getting burnt. They have only two toes with webbing in between. When walking on sand their toes splay out - the webbing stops them sinking!.



The camel's long eyelashes protect the camel's eyes from the sun and sand. They also have translucent eyelids so that during sandstorms they can close their eyes and still have partial vision.

Their thick coarse wool keeps the sun's heat out and allows air to circulate. Below the fur it can be up to 30°C cooler than on the surface. Elsewhere on their bodies camels have very thin fur to radiate any excess heat.

Camels sweat at a much higher temperature than other mammals and produce very concentrated urine. A camel's dung is so dry it can be used for fuel by nomads almost immediately.

Camels have long legs to keep them well above the hottest air layer just above the sand surface.

Rats - adapted to a wide range of habitats

Whilst camels are specialists, rats are generically adapted to many habitats. It is thought that both black rats and brown rats originated in Asian forests and spread all over the world following humans. Today rats are found almost everywhere apart from deserts, mountains and the poles.

Rats can eat a wide range of foods - in fact almost anything that is edible. All rodents' incisors continually grow throughout their life time.

Brown rats can breed at two months old, and can produce ten young in a litter - theoretically every month. Whilst they breed prolifically, rats are prey to many animals including snakes, foxes, stoats, weasels, owls and birds of prey.

Rats are excellent climbers and use their tails for balance.

Rats are very good at swimming and have reportedly swum for several days away from sinking ships.

Rats have excellent senses of smell, hearing, touch and taste; although their eyesight is quite poor (they are largely nocturnal).

Animals at Drusillas

Red panda

(Ailurus fulgens fulgens)

Red pandas are found in montane forests around the Himalayas. They have strong teeth and jaws which enable them to feed on bamboo. They have thick fur for warmth, even on the soles of their feet. They are excellent climbers, use their tail for balance and can rotate their ankles to aid climbing down trees. One of their wrist bones is longer and acts like a thumb, like that of a giant panda.

Linne's two-toed sloth

(Choloepus didactylus)

From rainforests in South America. Sloths spend most of their time hanging upside down from branches by their four limbs. Their fur often turns greenish due to algae growing in it; this acts as camouflage and also can be food for them. Sloths move very slowly, have a lower body temperature than other mammals and only urinate and defecate about once a week.

Chilean flamingo

(Phoenicopterus chilensis)

Flamingos are easily distinguished by their pink feathers, their long neck and legs, and their unusual hooked beak. Their colour is gained from the carotenoids in their food, such as crustaceans and molluscs. The beak is an adaptation for feeding and is used as a filter system - they submerge the beak in the water, then push the water out with their tongue, leaving only the tiny animals behind.

Humboldt penguin

(Spheniscus humboldti)

Humboldt penguins are found on the coasts of Chile and Peru. They often dig burrows in sand or piles of guano (droppings) to nest. The dinner jacket colouring of penguins acts as camouflage, when viewed from underneath, the gleaming white front of the penguin is difficult to see against the brightness of the surface. Penguins have a clear eyelid that helps them to see clearly under water, and they have bristles on their tongue to enable them to grip slippery fish.

Cape porcupine

(Hystix africaeaustralis)

These porcupines are found in a variety of habitats in central and southern Africa. Porcupines have developed quills as a defence mechanism so if threatened they will charge backwards jabbing their quills into the enemy. Spines are thicker, longer sharper versions of normal hair.

Giant anteater

(Myrmecophaga tridactyla)

From grasslands and tropical forests in Central and South America, they can tear into ant hills and termite mounds using the large claws on their front feet. Giant anteaters can eat 30,000 ants and termites a day. Their tongue is 50cm long and is sticky to help them pick up the insects.

Your Habitats & Adaptations session @ DRUSILLAS PARK

Your 30 minute education starts with a look at the different habitats where animals are found and that they vary enormously in size (from oceans and rainforests to under rocks and leaves).

The concept of adaptations is then introduced, focusing on two animals: camels from the desert and penguins from the South Pole. Costumes are used to dress two volunteers with items required to help humans survive as well as penguins and camels. This light-hearted look at body design and function helps reinforce the concept of adaptations and the effectiveness of animal species at surviving in difficult environments.

Animal artefacts on loan from H.M. Revenue & Customs are presented to the group to further show adaptations, these allow an opportunity to touch items that pupils may not otherwise come into contact with. Artefacts shown may include crocodile skins, turtle shells, elephants tusks, hippo teeth and a bear skin.

Finally we look at two live animals with their own amazing adaptations, which if possible, are animals that have adapted to either hot or cold environments or one that has adapted to a large range of habitats.

Naturally, health and safety is considered throughout and everyone is asked to clean their hands after touching animals and artefacts.

Activity Ideas

* Design a 'new' animal species with special features (specific adaptations) to help it live in a chosen habitat. Use a writing framework to help children explain what it looks like and why, where it lives, what adaptations it has and why, and can habitat and adaptations he linked?
* Create fact-file cards of different animals explaining their habitat and adaptations.
* Mix and match animals and their missing parts. Children discuss why a body part is/is not suitable for that animal. When all animals are correctly assembled children draw the animals and label their adaptations.
* Use photos of different habitats. Children identify differences between each. Children sort photos into what they classify as similar environments and then identify what animals may come from each and why.
* Pupils find habitats, plants, and animals within their school grounds and put them onto a map of the school. Children compare the habitats and animals and consider any specific adaptations.
* Compare climate data for different habitats.

FIND OUT MORE...

Useful websites:

www.drusillas.co.uk
www.www.panda.org
www.bbcearth.com/nature
kids.nationalgeographic.com/animals

DRUSILLAS PARK

Alfriston, East Sussex BN26 5QS
Tel: 01323 874117 e-mail: education@drusillas.co.uk
www.drusillas.co.uk