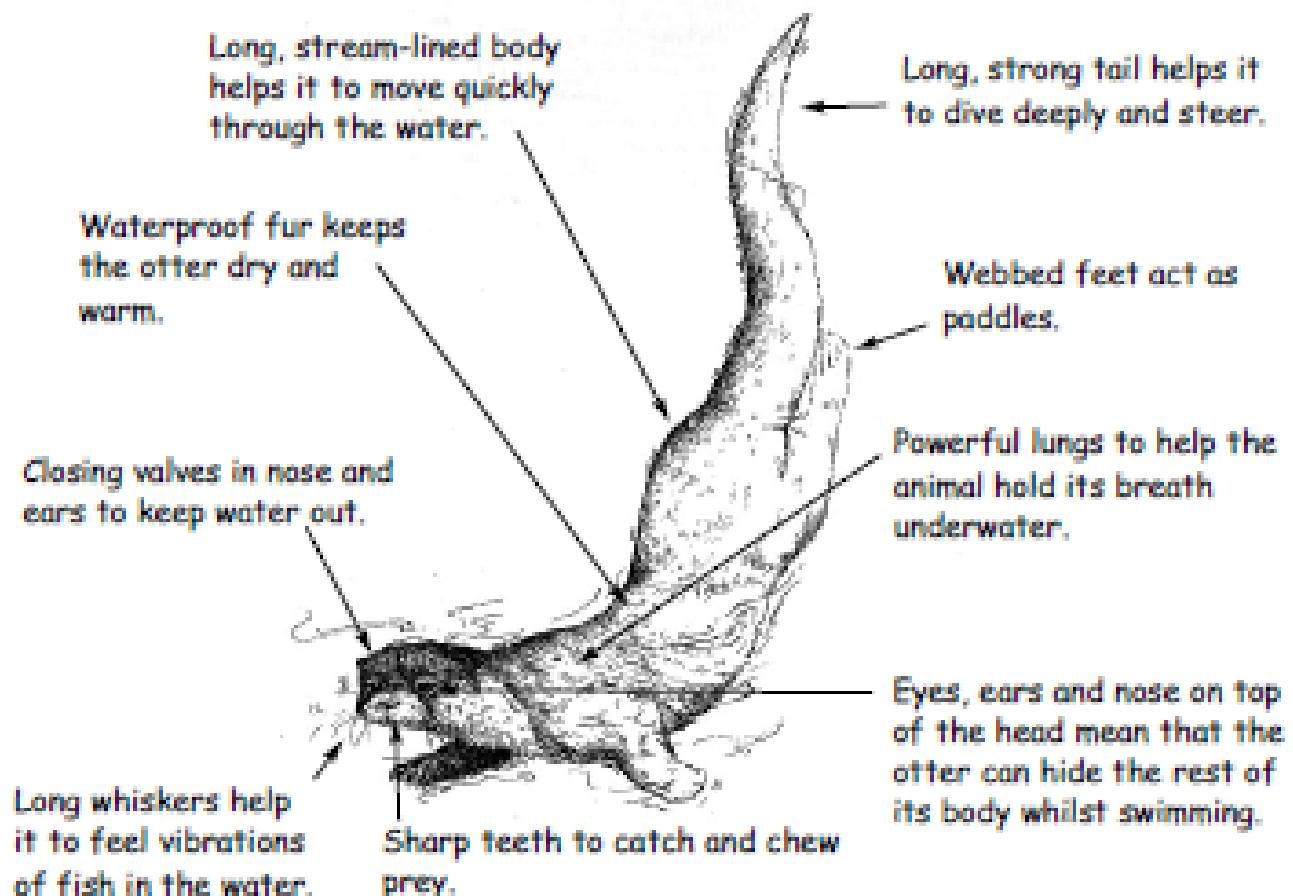


The Water Specialists

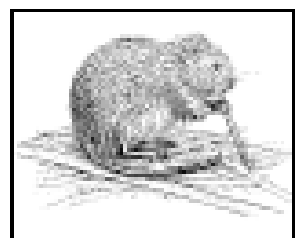
Otters have many features which mean they are suited for life in the water - they are aquatic animals.



Beavers are also adapted to live in and near the water. They also have webbed feet and waterproof fur. However, they do not have a long, stream-lined body as they do not need to swim as fast because they do not have to chase prey. Their tail is large and flat and they slap it against the water as a warning signal to other beavers. Also see rodent teeth p.11



Water voles spend time on the land and in the water so their bodies have to be adapted for both environments. Their fur is waterproof, but their feet aren't webbed. Also see rodent teeth p.11

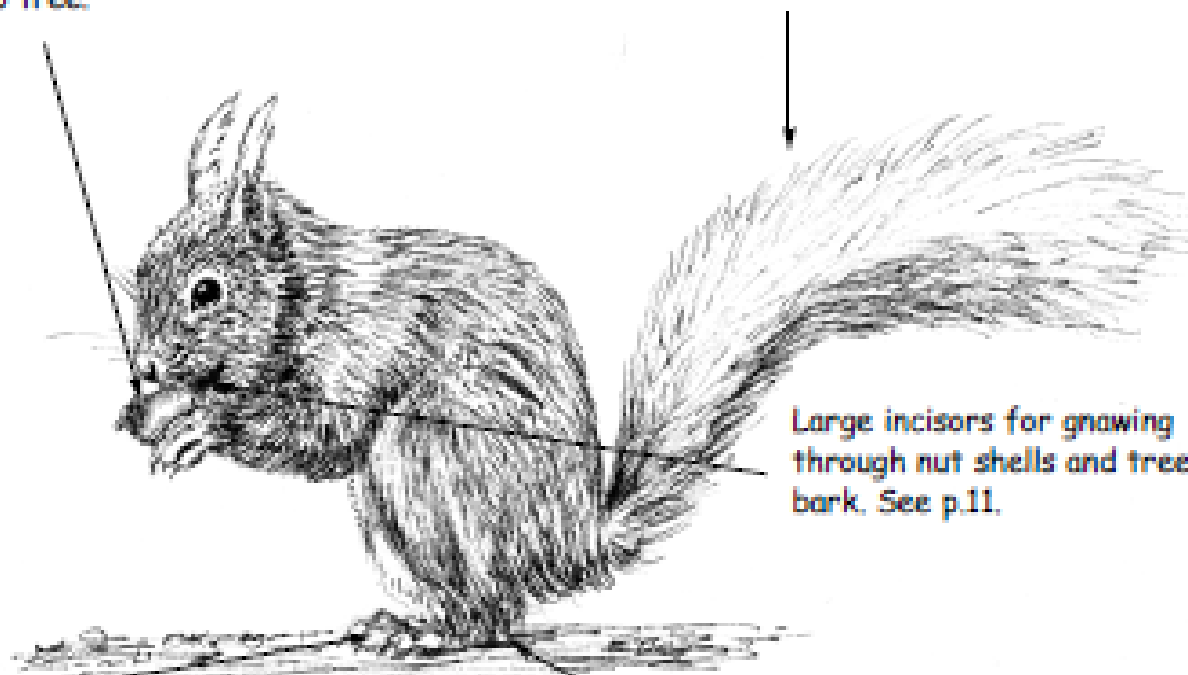


The Tree Specialists

Red squirrels spend a lot of their time up in the trees. They are arboreal.

Short front legs and longer hind legs allow it to leap easily from tree to tree.

Long tail helps it to balance on tree branches.

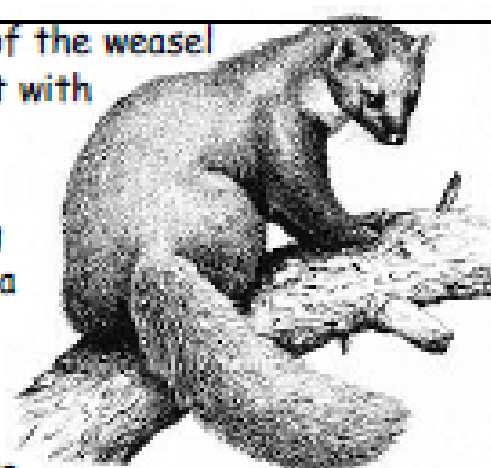


Large incisors for gnawing through nut shells and tree bark. See p.11.

Long claws help it grip tree bark whilst climbing.

Double-jointed ankles help it climb down a tree as well as it can climb up.

Pine Marten. The pine marten is a member of the weasel family. It is about the size of a domestic cat with chestnut-brown fur and a yellow bib. It also spends a lot of time in the trees. Like the squirrel it has double-jointed ankles and long claws to help it climb easily. If it falls from a tree, its body can twist to land safely on all fours from as high as 20 metres. Unlike the squirrel the pine marten is a carnivore and has predatory adaptations i.e. excellent sense of smell and hearing and eyes on the front of the head, as well as a carnivorous dentition. (see pages 9 and 11).



The Underground Specialists

Badgers make their home and spend most of the daytime underground.

Small head, with short, thick neck can be used as a shovel

Strong, reinforced skull acts as a hard hat

Stocky body with powerful muscles to help with digging

Long snout with bristles, good for getting into small holes to find food.

Short, strong legs are good for digging

Strong claws used for digging

Have only a single fur coat in the summer to shake off dust from earth burrows

Short tail - does not get in the way in the underground tunnels



Moles. Moles are also burrowing animals, in fact they spend much more of their time underground than the badger does and, as a consequence, they have even more specialist features. Their front feet are much more spade-like, with relatively longer claws. Mole fur lies well in any direction. This helps the burrowing animal move backwards along the tunnel in comfort and also prevents soil getting stuck in it.

Both badgers and moles have small eyes as eyesight is not so important for an animal that spends a lot of time underground.

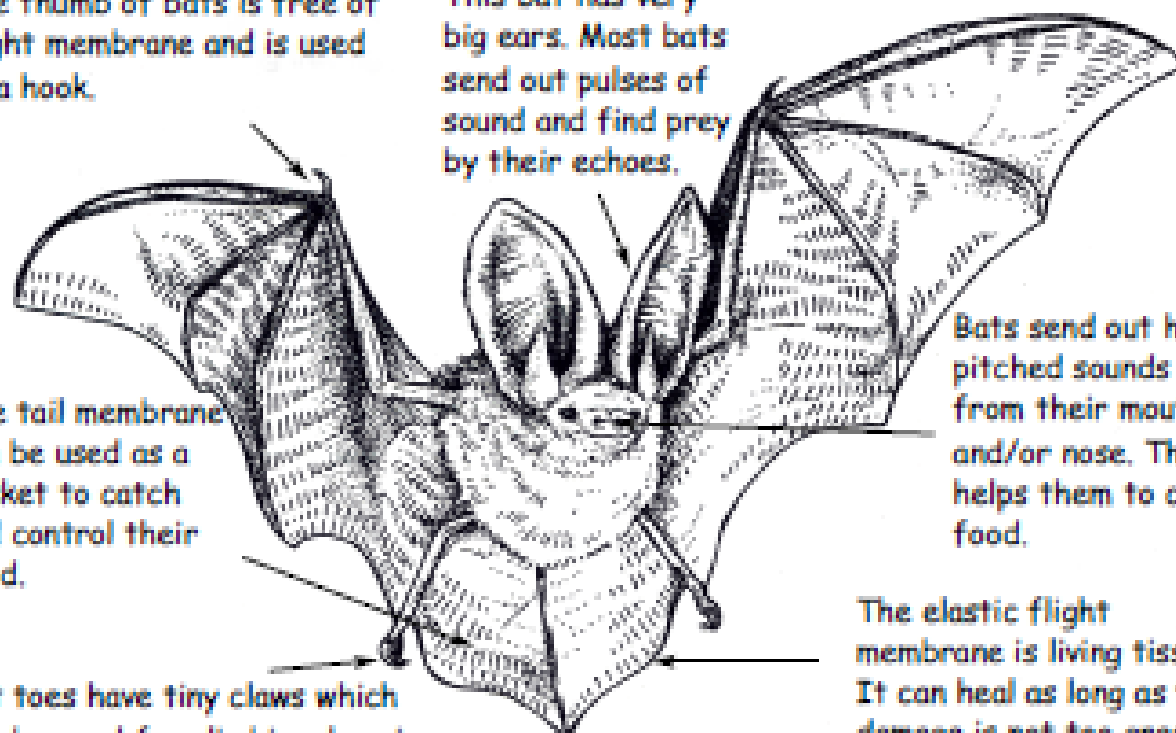


The Flying Specialists

Bats are the only mammals that are able to fly. The wings are made of a double layer of elastic skin, the forearm and fingers being adapted to provide a framework. Almost the entire bat is in fact wing!

The thumb of bats is free of flight membrane and is used as a hook.

This bat has very big ears. Most bats send out pulses of sound and find prey by their echoes.



The tail membrane can be used as a basket to catch and control their food.

Bats send out high-pitched sounds from their mouth and/or nose. This helps them to catch food.

Bat toes have tiny claws which can be used for climbing, hanging and grooming.

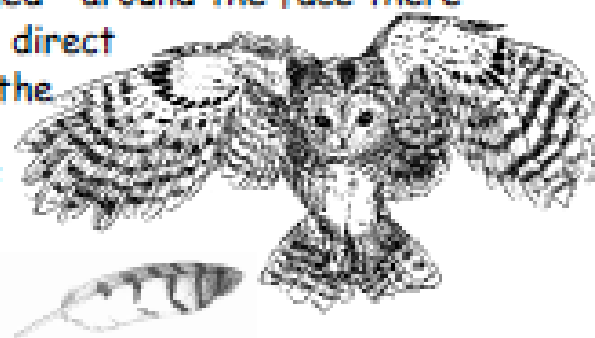
The elastic flight membrane is living tissue. It can heal as long as the damage is not too great.

Flight Facts Whether a bird, bat or an aircraft, the shape of the wings tells you something about the way it flies.

Long narrow wings are designed for faster flight and use less energy to fly longer distances.

Short broad wings are designed for slower flight, give more manoeuvrability, but use more energy.

Owls Owls are birds and therefore they have feathers instead of fur. Many of the owl's feathers are specially designed - around the face there are stiff facial disc feathers which help direct the sound. The most unique adaptation is the comb-like leading edge of the primary wing feathers. This muffles the sound of the air rushing over the wing surface allowing the owl to fly silently and thus capture prey by stealth.



Adaptations on a Small Scale

Harvest Mice. Harvest mice spend most of the spring and summer above ground in the upper layers of tall dense vegetation, especially grasses.

The smallest British rodent, their average weight is 6g (about as much as a 20p piece). This enables them to spend a lot of time at the top of grass stems, cereal stalks etc.

Its fully prehensile (capable of gripping) tail is used as a fifth limb. This enables it to grasp stems and assist during climbing. It is the only British mammal to have one of these.



Their hearing is exceptionally good and they will react sharply to sounds up to 7m away. This is a good adaptation for an animal which has many predators.

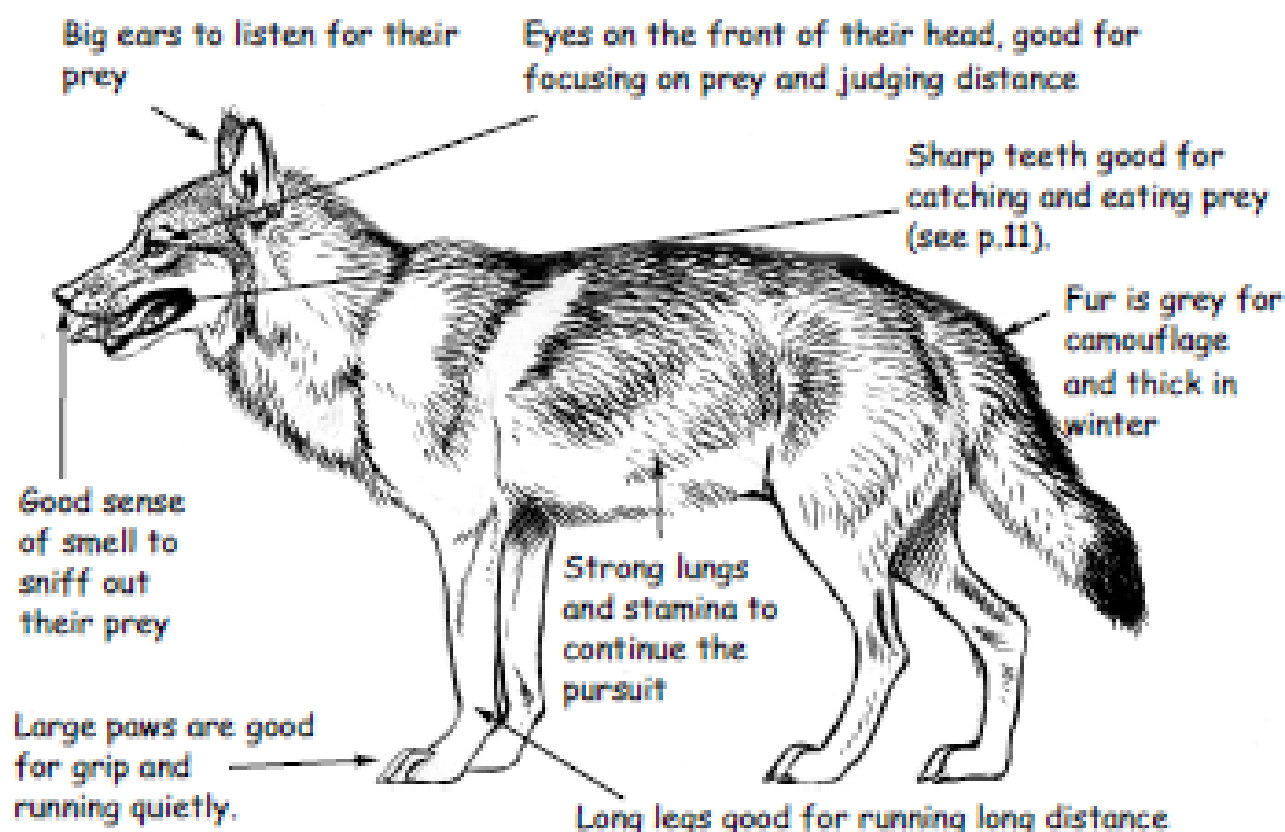
It is the only British mouse to build nests of woven grass well above ground. The mouse uses its incisors to shred lengths of living grass, whilst sitting on another stalk supported by its hind feet and tail.

Dormice. Dormice are slightly larger than harvest mice (average weight 20g) and are adapted for life in the trees rather than in grassland. They have amazing agility and can climb and jump among leaves and branches at astonishing speed. They have gripping pads on their feet giving them 'sticky feet', which help them to climb and grip smoother surfaces. Like squirrels they have a bushy tail and their hind-feet can be rotated at the ankle, allowing the animal to hang upside down by its claws. They are also nocturnal and have large eyes to help their night sight and very long whiskers to help them feel their way about amongst the tree branches.

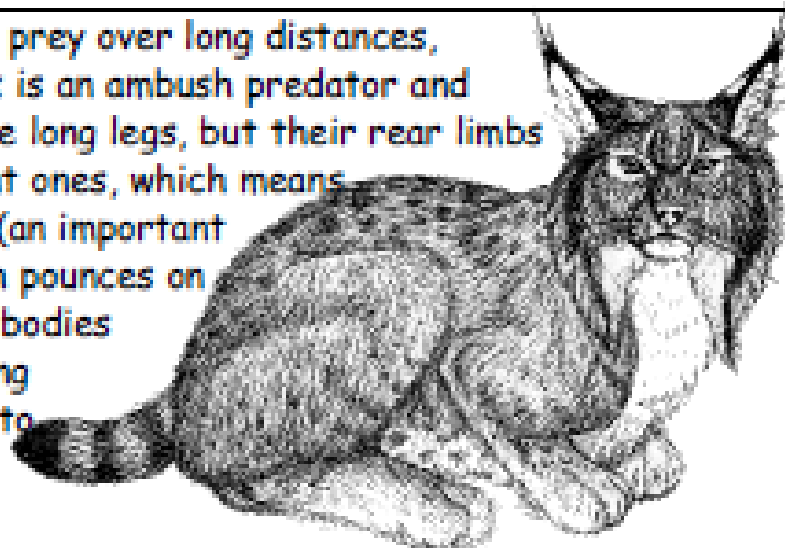


The Predator

Predators are animals that eat other animals to survive. They are **carnivores**. **Wolves** are predators.

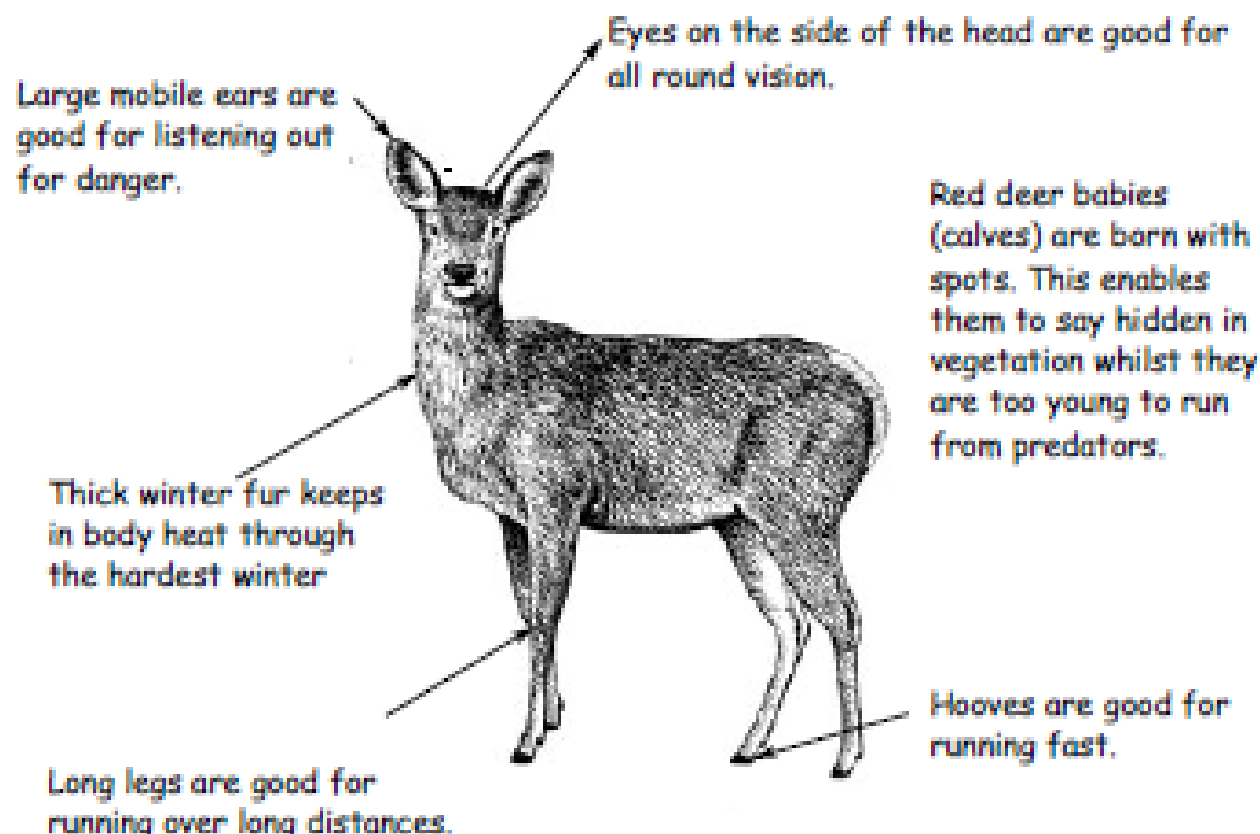


Lynx. The wolf chases its prey over long distances, whereas the Eurasian lynx is an ambush predator and hunts alone. Lynx also have long legs, but their rear limbs are longer than their front ones, which means they are good at jumping (an important factor for an animal which pounces on its prey). They have stout bodies which mean they are strong enough to carry their kill to a safe hiding place.



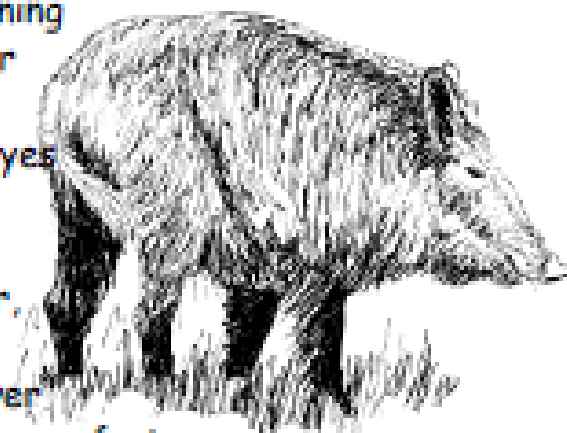
The Prey

Prey are animals that are eaten by other animals. This means that they are in the middle of the food chain and usually eat plants. Animals which eat plants are called **herbivores** (see p.11). However, some animals which get eaten by other animals are **omnivores** and some are even **carnivores**. **Red deer** are herbivores.



Wild Boar. Wild boar are omnivores which means they can eat meat as well as plants. However, they may be eaten by predators, particularly the piglets. They also have hooves for running fast, although their legs are much shorter than a deer, so they would not be able to run over such long distances. They have eyes on the side of the head, large ears and a very good sense of smell.

Using a similar adaptation to the red deer, wild boar piglets are born stripey for camouflage. The stripes gradually fade over a few months when the piglets are able to run fast.



Teeth Adaptation

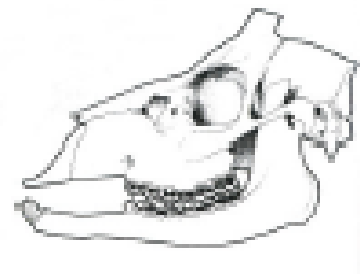
Carnassial teeth



Wolf - large canines and shearing (carnassial) teeth at the back.

The canines are used for piercing flesh and the shearing teeth are used like scissors. These are the teeth of a predator or carnivore.

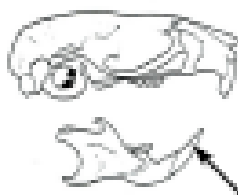
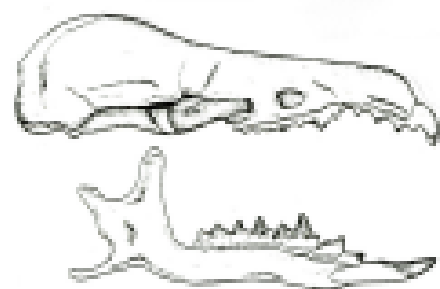
Roe deer - no upper incisors or canines. Big, flat, grinding molars help to break down woody vegetation. These are the teeth of a herbivore.



Molar teeth

Badger - large canines help to pierce flesh, but flat molars enable them to eat many other food stuffs. These are the teeth of an omnivore (compare them with your own teeth).

Shrew - sharp, peg-like teeth enable this animal to crunch insect cuticles. These are the teeth of an insectivore.



Incisor teeth

House Mouse - large incisors for gnawing which are continuously growing. The incisors are covered by very hard enamel which help to create a chisel-like edge. These are the teeth of a rodent.

Furry Facts

Only mammals have fur. Most mammals have at least two layers of fur; this consists of a woolly undercoat for warmth and an outer layer of coarser guard hairs for protection from the rain.



Fallow deer fur is spotty. Spots and stripes are a good adaptation to woodland habitat as they match the patterns that sunlight makes as it streams through the leaves. This provides the animal with camouflage.

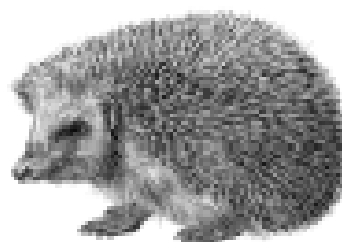
These wild boar piglets are stripey.

They gradually lose the stripes as they get older, when they are better able to defend themselves.



Arctic fox fur is very, very thick to keep the animal warm in very cold conditions. They even have fur on their footpads, as well as between their toes. This keeps their feet warm and also acts as snowshoes. In winter, their fur is white for camouflage in a snowy habitat. In summer they moult their thick, white winter coat to leave a brown or blue fur coat underneath. Stoats may also turn white in winter; they are then called ermine.

Hedgehog fur has evolved to form spines. It is the only spiny mammal in Britain. The upper parts of the body are covered in short yellow-tipped spines which may number up to 5,000. The hedgehog is able to roll into a ball as an adaptation to escape predators. The rest of the body is covered in brown fur.



Owls are birds so they have feathers. These are very light and are shaped to help the animal to fly. Birds can have up to five feather types - each with a specific function.

Furry Facts

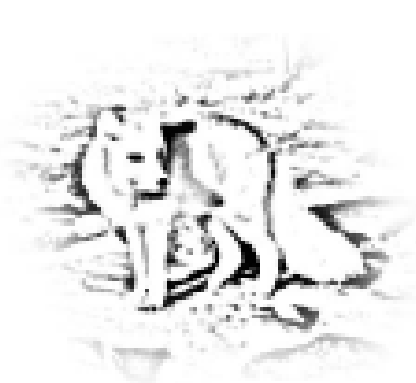
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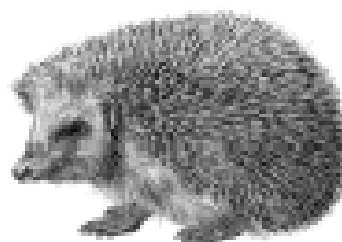
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Behavioural Adaptations 1

Nocturnal animals

These are animals which come out at night and sleep during the day. Different animals might do this for different reasons:

1. To avoid predators.
2. To avoid disturbance by people.
3. The main prey of a particular animal might be easier to catch at night.
4. Animals in hot countries often come out at night to avoid the heat of the day.

These behavioural adaptations then lead to more physical adaptations. Most nocturnal animals have at least one of the following features:

1. Large eyes, for good night sight.



2. A reflective layer of cells at the back of the eye to help them see in the dark.

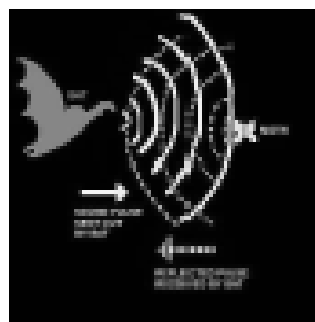


3. A very good sense of hearing and/or smell.

4. Long whiskers to help them move around in the dark.



5. The ability to stay hidden during the day, often using camouflage.



6. Bats send out high-pitched sounds in pulses either from their mouth or nose. These pulses of sound bounce off insects and other objects in their environment. By listening to their echoes they are able to find them. This is known as echolocation.

Examples of nocturnal animals include badgers, bats, hedgehogs, foxes and owls.

Behavioural Adaptations 2

14

Hibernating animals

Hibernation is an adaptation to a limited food supply. Most animals find it difficult to find enough food in winter when food is often in short supply. Some animals solve this problem by hibernating. Hibernation is like a deep sleep which helps to save energy. It occurs during the winter months - sometimes as long as from November to April.

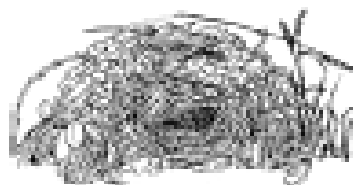
Adaptations for hibernation:

1. During hibernation the animal's body temperature drops - usually to almost the same temperature as the animal's surroundings. This is often just a few degrees above freezing.

2. The animal's heartbeat and its breathing slow right down so that it does not use much energy. Bats' hearts normally beat 400 times per minute, but during hibernation they can drop to 11-25 beats per minute. This torpid state saves them 99.3% of their energy. Hedgehogs' pulse rate drops from 190 beats per minute to 20. It takes only 1 breath every minute or two.

3. Hibernating mammals get ready for their winter sleep by eating extra food and storing it as body fat which gets used up whilst sleeping.

There are only three true hibernators in Britain. These are bats, dormice and hedgehogs.



Hedgehog winter nest

Where to hibernate?

Animals which hibernate need to find a sheltered, frost free place safe from predators. Hedgehogs build a nest mostly of leaves, underneath brushwood or brambles.

Bats' hibernation places have a special name - hibernacula. They need to be both cool and humid to prevent wing membranes drying out.

Dormice spend the warmer months up in the trees, but come down to the ground to hibernate.

Waking up

Even a mammal in deep hibernation has to arouse itself occasionally to excrete waste products. This uses up a lot of energy so a special 'brown fat' forms near the animal's brain, heart and lungs. When it's time to wake up, it uses this fat to send a quick burst of energy to warm these organs first.

