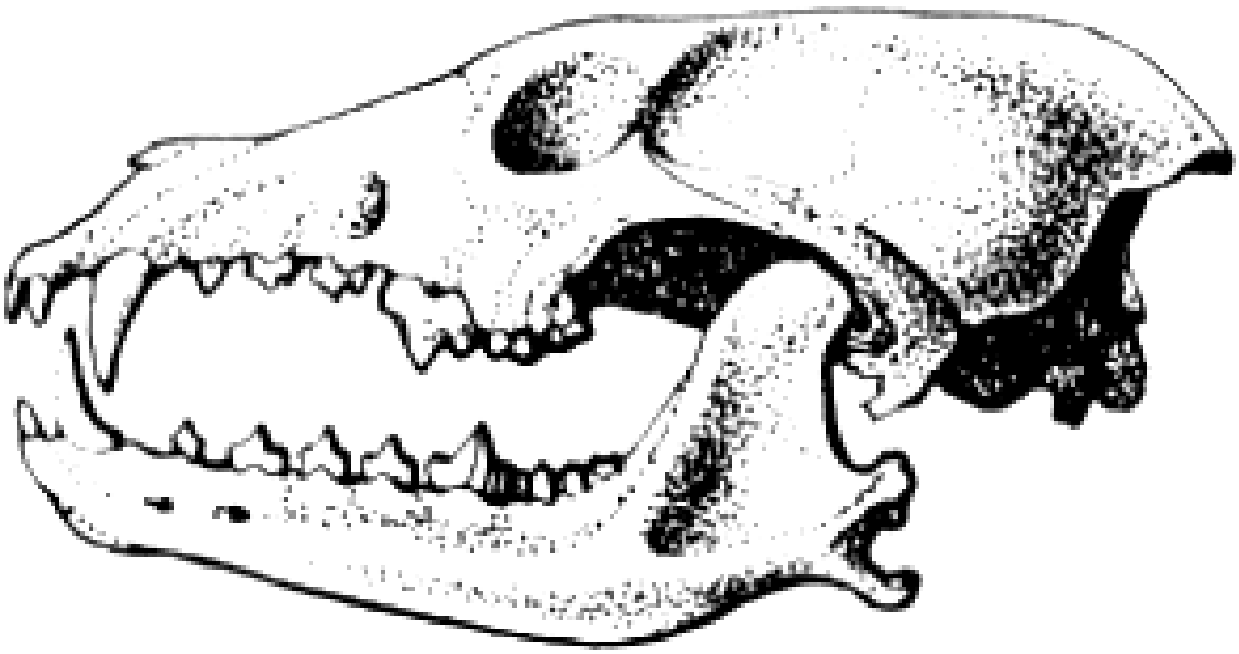
# Adaptation

## A Wildwood KS2 Teachers' Pack and Activity Sheets



Wolf Skull

# Teachers' Guidance Notes



This teachers' resource pack is designed to support the National Curriculum KS2 topic of adaptation. Adaptations are any physical or behavioural characteristics of an animal that help it to survive in its environment. These characteristics fall into three main categories: body parts, body coverings and behaviours. Any or all of these types of adaptations play a critical role in the survival of an animal.

The pack focuses mainly on British mammals and can be used on its own or in conjunction with a visit to Wildwood Trust.

The first part of the resource pack is information for teachers to introduce the topic of adaptation; some sheets may be used as a literary resource for older children to find out information. The second part features a series of classroom activity sheets.

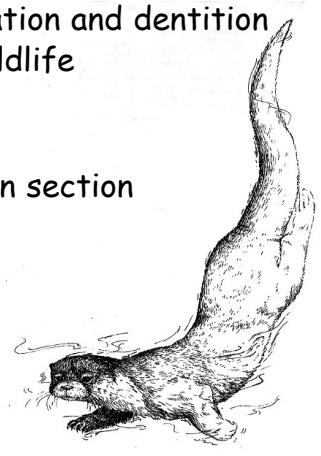
Wildwood is a centre of excellence for British wildlife and stands on the edge of the Blean, one of the largest tracts of ancient woodland in southern England. In our natural woodland enclosures we house many examples of British wildlife including:

- beavers adapted to an aquatic lifestyle.
- red squirrels and pine martens adapted to an arboreal lifestyle.
- badgers adapted to an underground lifestyle.
- owls adapted for flight.
- harvest mice adapted to grassland and hedgerows.
- wolves, foxes and lynx adapted to a predatory lifestyle.
- deer and wild boar adapted to escape predators.

In addition we have an impressive collection of skulls, antlers and horns along with some whole skeletons and plaster casts of footprints.

Our education department offers children studying adaptation a guided tour focusing on this topic and/or an interactive workshop in the education centre. Children are able to handle and examine a range of mammal artefacts for adaptation and dentition studies in a team event which enables children to test their wildlife detection skills and understanding of mammal adaptation.

If you are interested in more details, please visit the Education section of our website, www.wildwoodtrust.org.



*Otter displaying aquatic adaptations*

# Teachers' Guidance Notes for Activity Sheets

**Sheet 1.** This activity should be carried out after the children have been given some background information contained in the first half of the resource pack.

**Sheet 2.** Encourage the children to discuss why they have drawn that particular habitat.

**Sheet 3.** Children should be encouraged to discuss how they decided on their answers. See if they can identify the different types of teeth from the diagrams and when drawing their own teeth.

**Sheet 4**. The tracks and pictures are not drawn to scale; this may need to be pointed out to the children to avoid confusion. What do the children observe about the footprints e.g. can they see claws or webbing - do any of them look like a hoof-print?

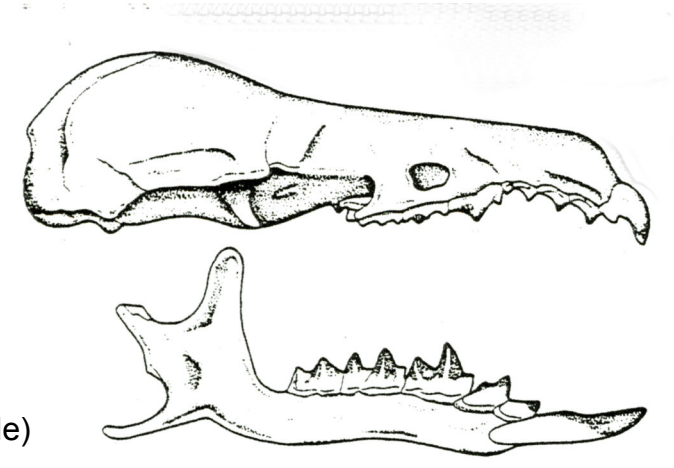
**Sheets 5-10**. Teachers' notes are included.

**Sheet 11.** Discuss how the adaptations might help each animal:

- Antlers used for fighting for females.
- Hooves good for running.
- Bushy tail good for balance and visual.
- Stream-lined body good for swimming.
- Front legs are much shorter than its back legs to help the squirrel jump from tree to tree.

Make sure children write the full name of the animal underneath the picture.

**Sheet 12.** This activity has been set to encourage children to use their imagination, along with the knowledge they've gained after studying this topic. The habitat can be imaginative as well and the children don't have to stick to mammals; they can describe dinosaurs or aliens if they'd rather! As long as the adaptations would be beneficial in its environment.



Shrew skull (not to scale)

# Adaptation - an introduction



Adaptation is a word used to describe the fact that an animal's (or plant's) features are suited to its habitat and to the type of food that it eats.

A habitat is a place where an animal or plant lives. Examples of habitat include woodlands, desert, fields, the sea or even a single flower. Most of the habitat at Wildwood is woodland.

Animals can either eat other animals (**carnivores**) or plants (**herbivores**) or both (**omnivores**). Animals have evolved so that they can catch and eat in their food in the most efficient ways.

Different animals live in different habitats and eat different types of food.

Some animals are very specialised and are only adapted to live in one particular habitat e.g. otter. Some animals are more general and can live in lots of different habitats e.g. red fox.

The members of the weasel family are adapted to different types of habitat. Even though these animals are closely related, they look very different.

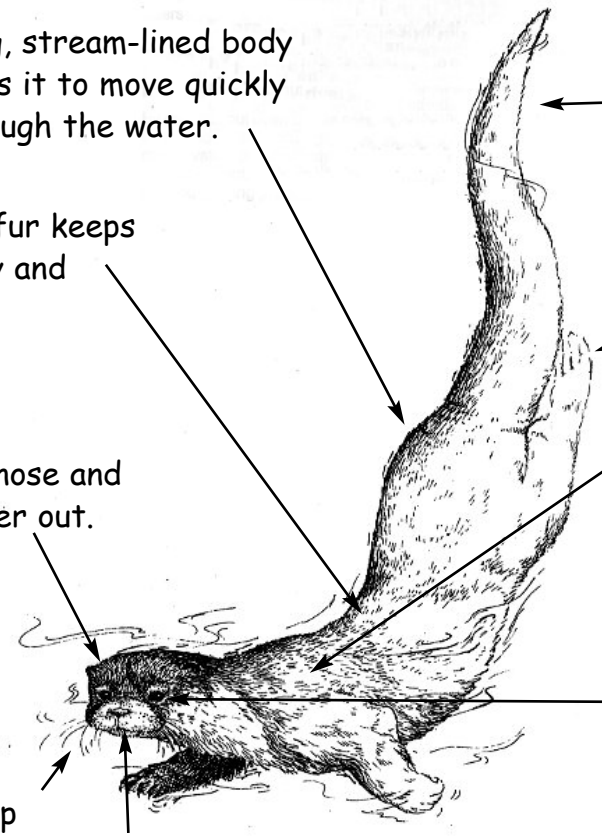
Otters live near water.

Badgers live in an underground home in the woodland.

Pine martens spend lots of time up in the trees in the woodland.

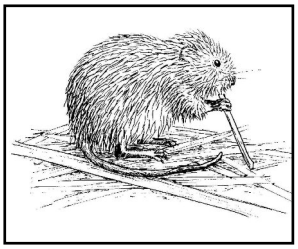
# The Water Specialists

**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

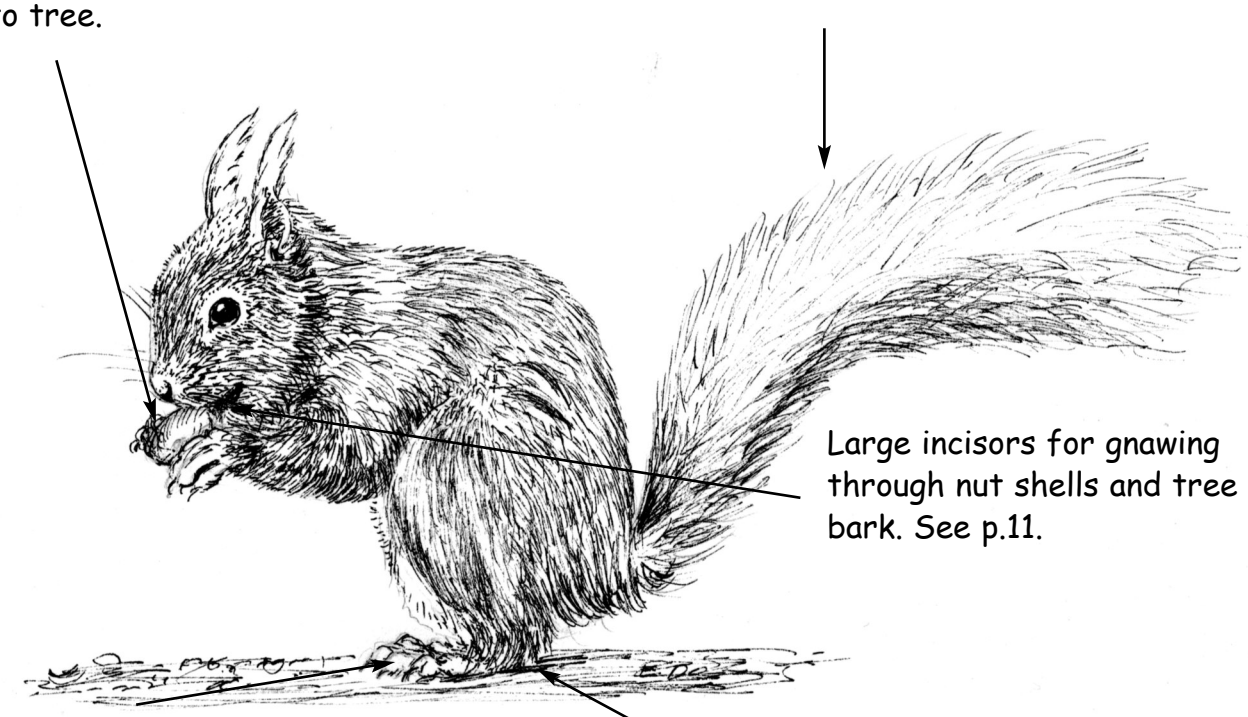


# The Tree Specialists

**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.

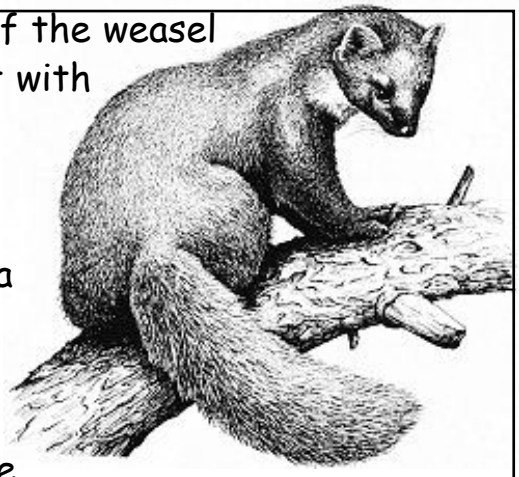


Large incisors for gnawing through nut shells and tree bark. See p.11.

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.

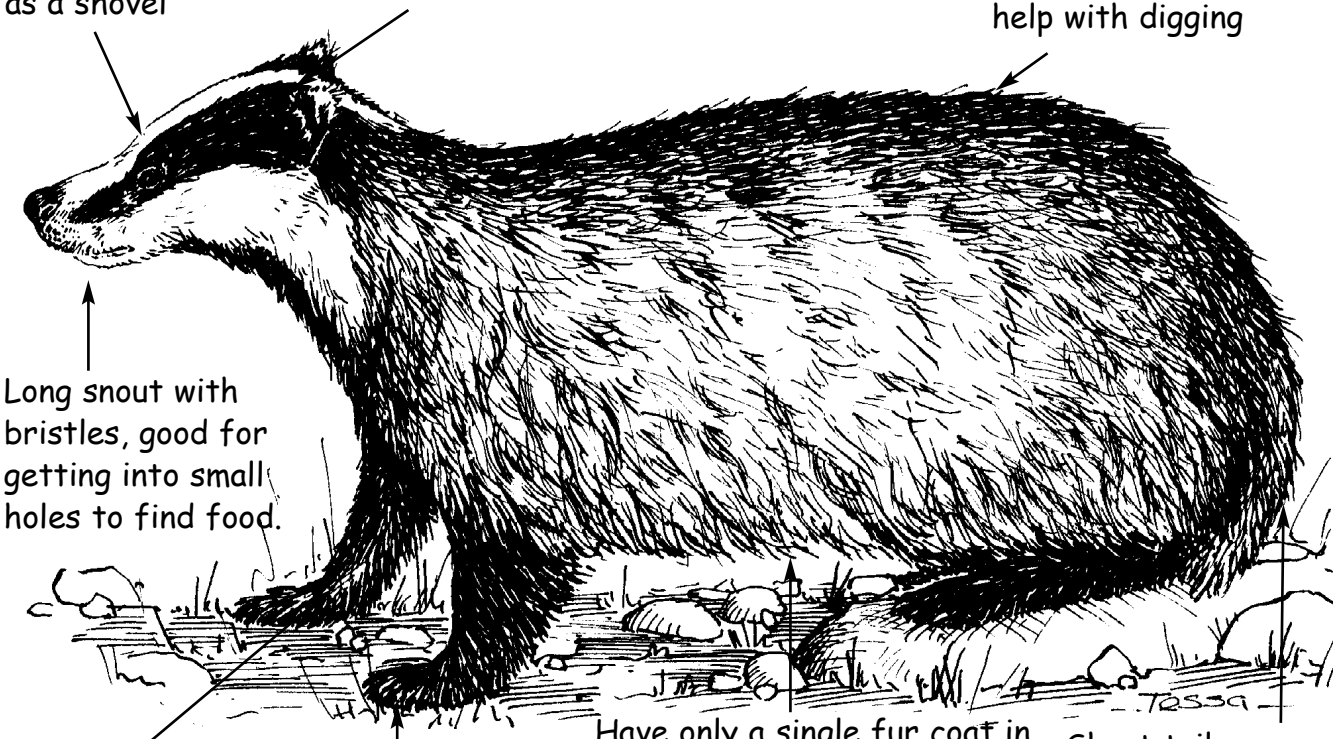
**Pine Marten.** The pine marten is a member of the weasel family. It is about the size of a domestic cat with chestnut-brown fur and a yellow bib. It also spends a lot of time in the trees. Like the squirrel it has double-jointed ankles and long claws to help it climb easily. If it falls from a tree, 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).



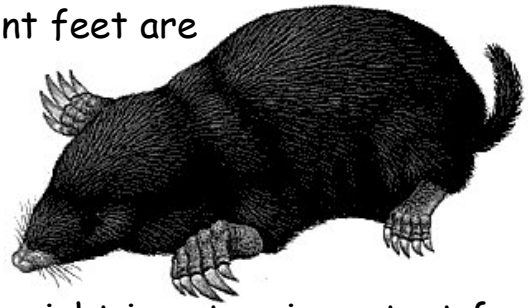
Pine marten by Charlotte Matthews

# The Underground Specialists

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



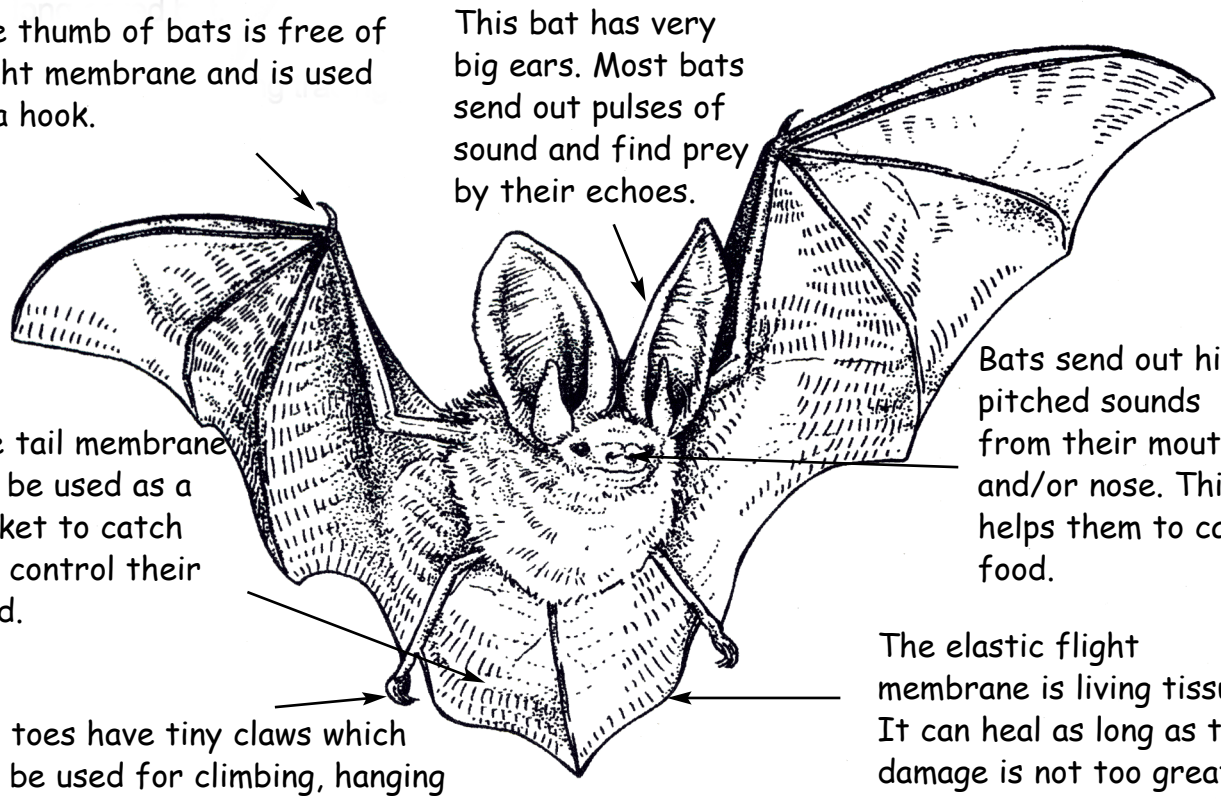

**Moles.** Moles are also burrowing animals, in fact they spend much more of their time underground than the badger does and, as a consequence, they have even more specialist features. Their front feet are much more spade-like, with relatively longer claws. Mole fur lies well in any direction. This helps 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.

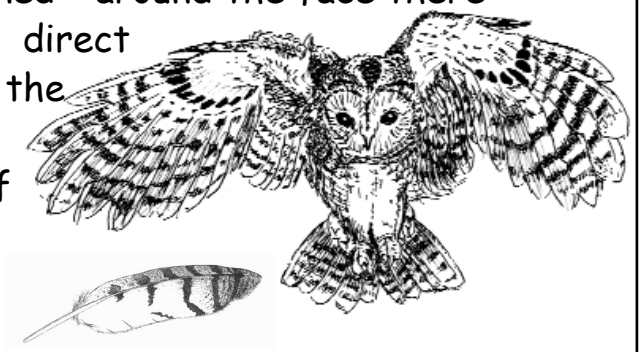
# The Flying Specialists

**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!




**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.

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.

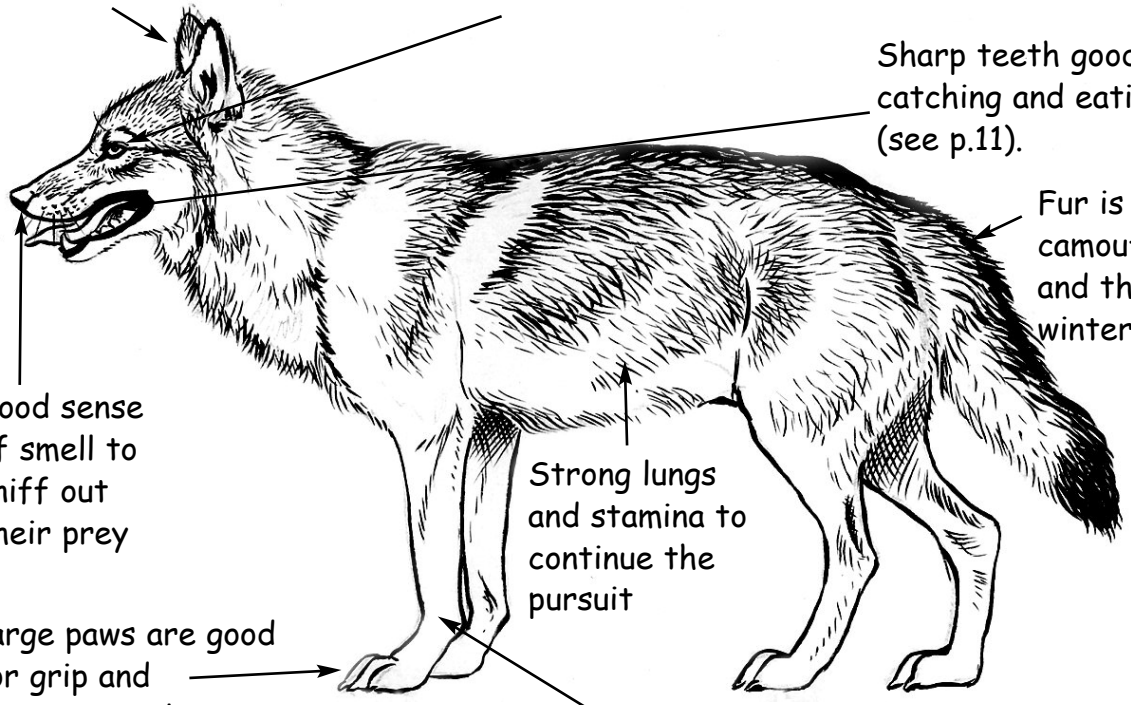
It is the only British mouse to build nests of woven grass well above ground. The mouse uses its incisors to shred lengths of living grass, whilst sitting on another stalk supported by its hind feet and tail.

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.

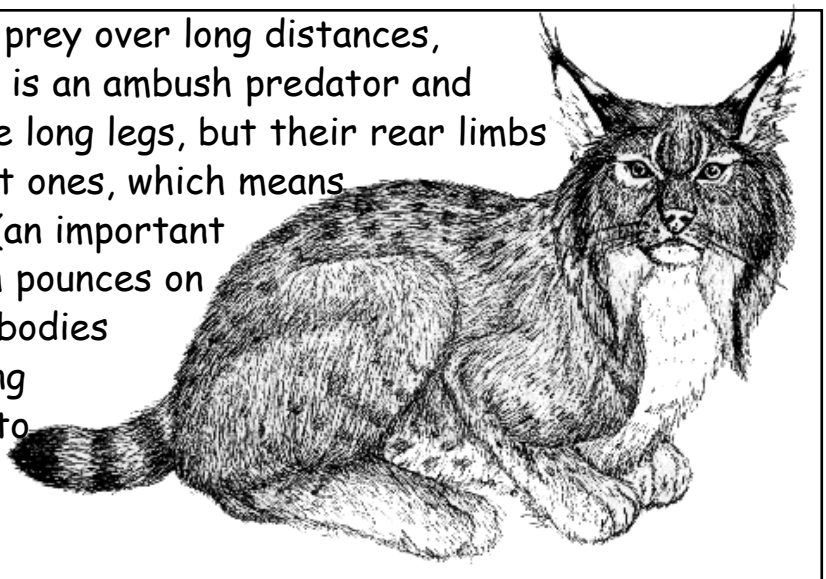
**Dormice.** Dormice are slightly larger than harvest mice (average weight 20g) and are adapted for life in the trees rather than in grassland. They have amazing agility and can climb and jump among leaves and branches at astonishing speed. They have gripping pads on their feet giving them 'sticky feet', 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.

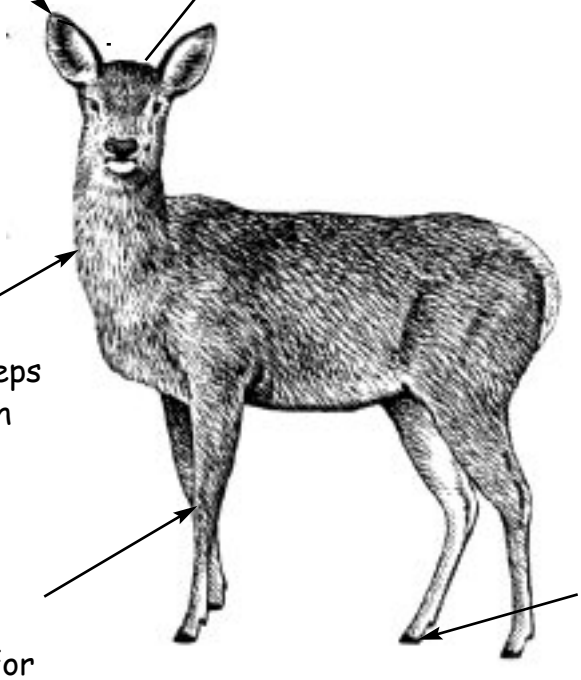



**Lynx.** The wolf chases its prey over long distances, whereas the Eurasian lynx is an ambush predator and hunts alone. Lynx also have long legs, but their rear limbs are longer than their front ones, which means they are good at jumping (an important factor for an animal which pounces on its prey).They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

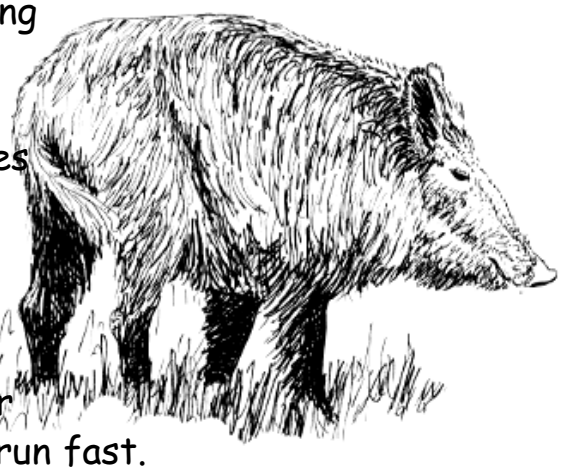


# The Prey

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.

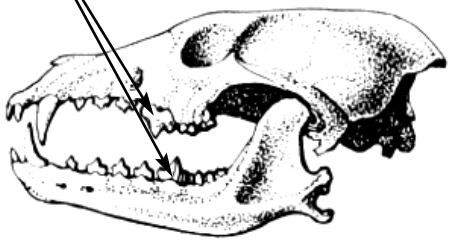



**Wild Boar.** Wild boar are omnivores which means they can eat meat as well as plants. However, they may be eaten by predators, particularly the piglets.They also have hooves for running fast, although their legs are much shorter than a deer, so they would not be able to run over such long distances. 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.



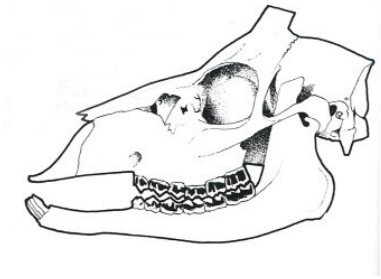
# Teeth Adaptation

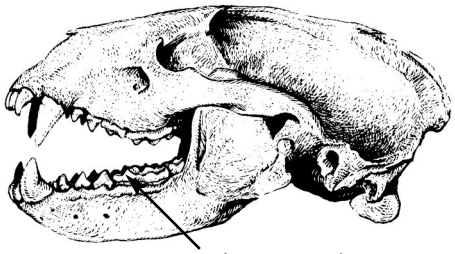
Carnassial teeth



**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**.

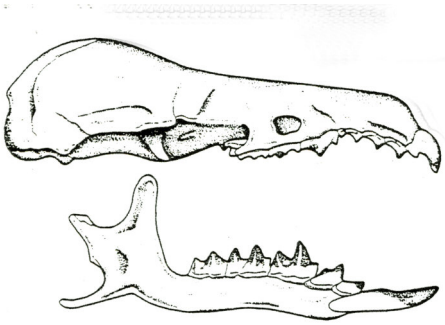




Molar teeth

**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.

See Activity Sheet No.3

*Pictures of skulls are not to scale.*

# 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.

# 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:

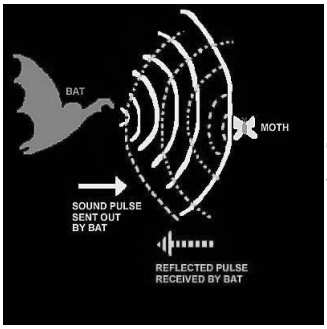
1. Large eyes, for good night sight.

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

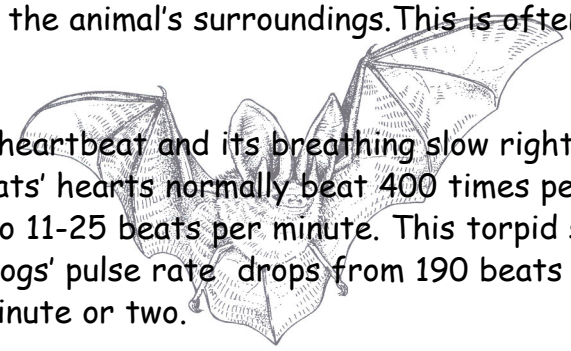


## Hibernating animals

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:

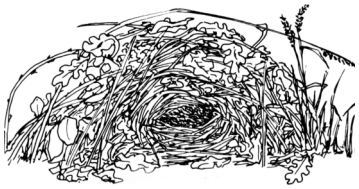
1. During hibernation the animal's body temperature drops - usually to almost the same temperature as the animal's surroundings.This is often just a few degrees above freezing.



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.

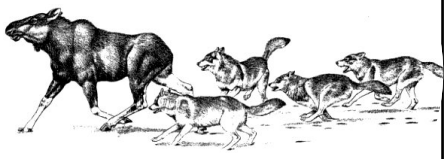
# Behavioural Adaptations 3

## Social animals

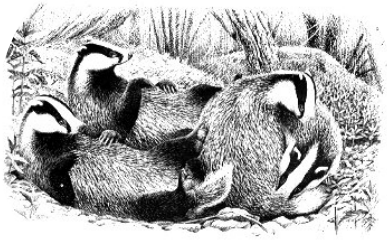
Social animals live in groups and solitary animals live on their own. Whether an animal is solitary or social is a behavioural adaptation to its environment. But the reasons why an animal is solitary or social might not be fully understood. Also, some animals might be solitary at certain times of year and social at others.

Wolf pack

Some predators might live together so that they can catch bigger animals to eat.



Badger clan



Some animals live together so that they can let each other know where the best food is.

Red deer herd

Some animals live together for protection from animals that might want to eat them. There is 'safety in numbers' if you live in a group.

**Social Facts.** It is important that animals that live in groups are able to recognize other members of their group/family. Each wolf has its own individual howl - when the pack goes hunting, they may need to separate. Howling is a way for group members to keep in touch.

Badgers have an amazing sense of smell. Each badger has smelly glands at the base of its tail which give it its own special smell. Family members are able to recognize each other by sniffing. All the badgers in a family group rub their smell on each other.This means each family has its own smell, which means strangers can be recognized and chased away from the territory.

Group members might also be recognized by individual markings.

# Behavioural Adaptations 4

## Solitary animals

Solitary animals are animals that live on their own. Although sometimes solitary animals can form small groups.

Red fox

Some predators live on their own because they hunt by stalking and pouncing. If there were a lot of animals doing this, their prey would run away.

Stoat

Some animals live on their own because there wouldn't be enough food for lots of animals to live in the same place.

Pine marten

Some animals live on their own because there are not enough places to live for a group of animals.

**Solitary Facts.** Even solitary animals need to find each other at some time, because they need to meet up to breed. The main way they do this is by leaving messages for each other in the form of droppings! Otter droppings are called spraints. They usually leave these in a place which is very visible e.g. on a rock or a tree stump, or a bend in the river. By sniffing these spraints another otter can find out about the otter that left them. For example, whether it's male or female, whether it's ready to breed and how long ago it was there.

***Pooh!***

# Activity Sheet No.1

## Take a close look at an animal

Choose an animal from the park and draw it in the box below. Write about how you think it's adapted to its environment. Look at its physical features and behaviour and think about where it lives and what it eats. How does adaptation help to defend itself from predators and to find food?

My chosen animal is a_____

Adaptations (as many as you can list)

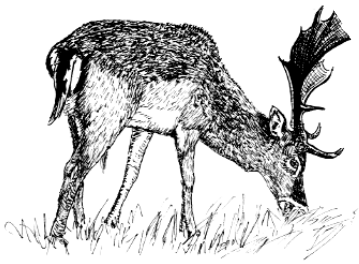
1. ---
2. ---
3. ---
4. ---
5. ---
6. ---
7. ---

# Activity Sheet No.2

## Where do I live?

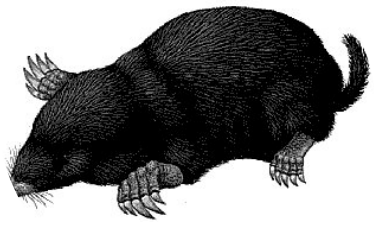
By looking at their adaptations, draw what you think would be good habitat for each of these animals.

Fallow deer



Otter

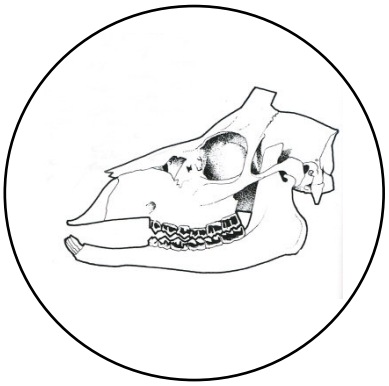
Mole

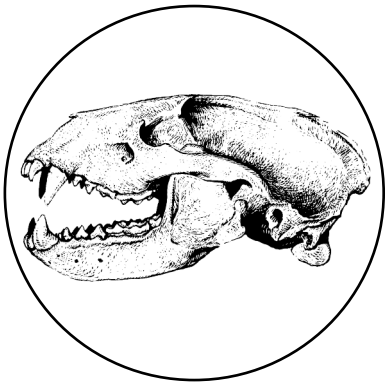


# Activity Sheet No.3

## Let's look at teeth

Look at the three skulls below. Look at the different types of teeth and decide whether you think they belong to a carnivore, herbivore or omnivore.



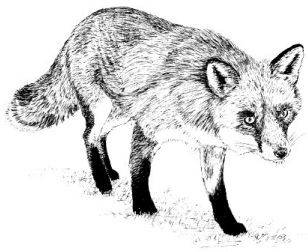


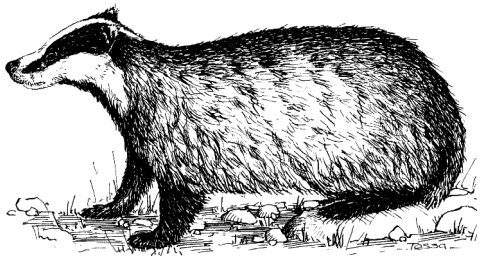
Now, in the space below can you draw a diagram of your own teeth (use mirrors to help you), or draw a friend's. Do you think you are a carnivore, herbivore, or omnivore?

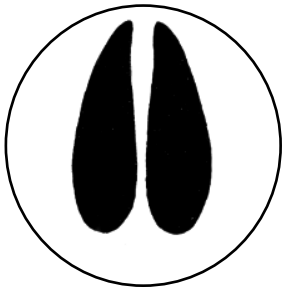
# Activity Sheet No.4

## Whose footprint?

Match each animal to its footprint. Draw a line from the animal to the correct footprint.







# Activity Sheets No.5-10
## Adaptation Game

There are two ways in which this game can be played.

## Method 1.

The object of the game is to identify the eight mammals from the clues given.
**Instructions.** Photocopy the pictures and clues on the following five pages on to coloured card - a different colour for each animal. Cut out all the individual pictures and clues. Four clues are provided for each animal which means there are thirty two clues altogether. Each pupil can be given one clue. They should then find others in the class with clues the same colour and sit as a group and decide what animal they think is being described. When they have decided they can ask for the species card that is the same colour to see if they were correct.

## Method 2.

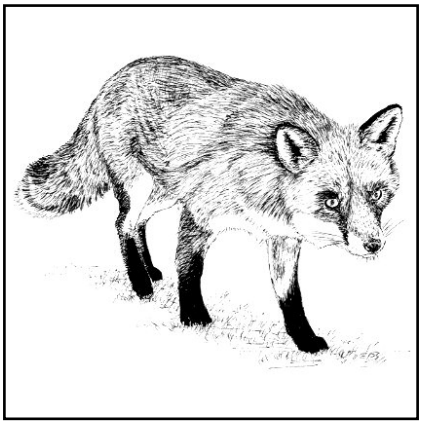
The object of the game is to try to match the clues to the correct species.
**Instructions.**Photocopy the pictures and clues on the following five pages onto white paper. Cut out all the individual pictures and clues. Split the class into groups.
Hand out a complete set of clues (jumbled up) to each group, plus a picture of each animal. The group must then try to work out which clues belong to which animal.

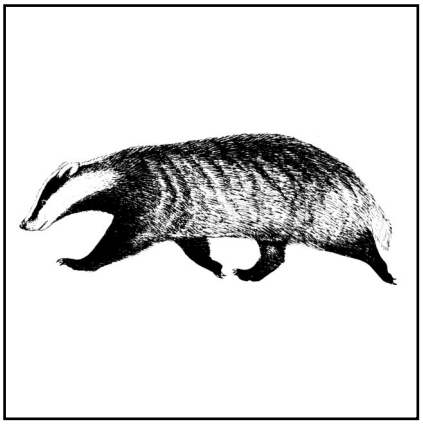
When the game is over ask the children how they think the adaptations help the animal in its particular environment or lifestyle.

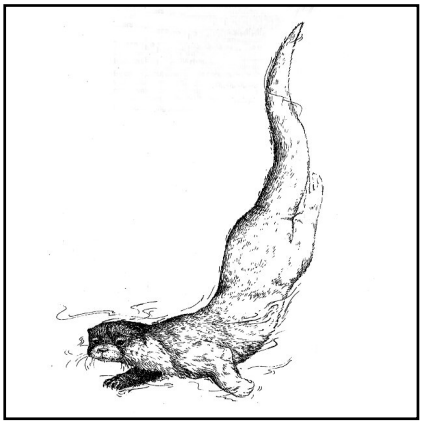
This game has been adapted from the *Biodiversity of Northern Ireland Education Resource Pack.*

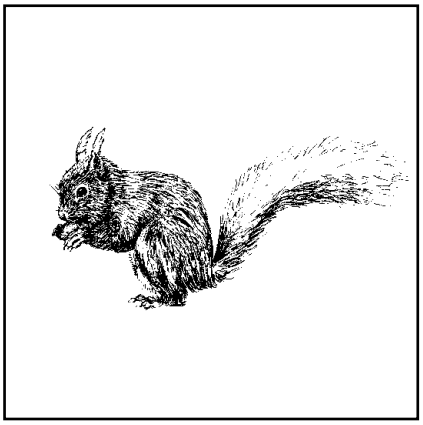
# Activity Sheet No.6

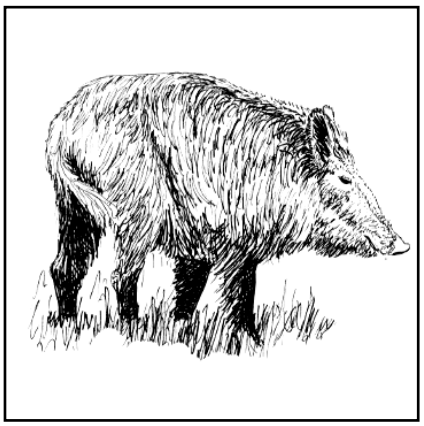
## Adaptation Game (continued)

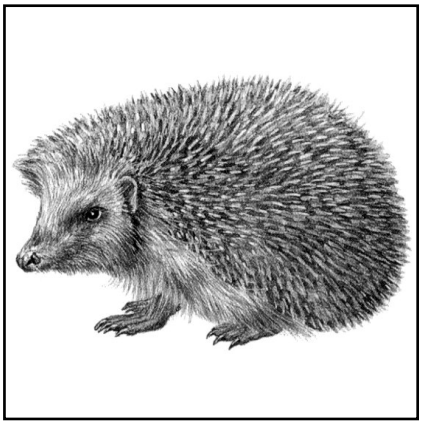












# Activity Sheet No.7

## Adaptation Game (continued)

Red Fox

| | | |
|---|---|---|
| I have large canine teeth | I have eyes on the front of my head. | I have large ears. |

Badger

| | | |
|---|---|---|
| I pounce on my prey. | | I have short legs. |
| I have long claws. | I have a good sense of smell. | I have canine teeth and flat molars. |

# Activity Sheet No.8

## Adaptation Game (continued)

Otter

| | | |
|---|---|---|
| I have webbed feet | I have stoppers in my nose and ears | I have long whiskers |

Fallow Deer

| | | |
|---|---|---|
| I have large canine teeth | | I have eyes on the side of my head |
| I have long legs | I have large, grinding molar teeth | I have a spotty coat |

# Activity Sheet No.9

## Adaptation Game (continued)

Red Squirrel

| | | |
|---|---|---|
| I have large, gnawing incisor teeth | I have double-jointed ankles | I have a bushy tail |
| I bury my food in the autumn | | My canine teeth are large tusks |
| I have a large snout | I root in the ground to find food | My babies are stripey |

Wild Boar

# Activity Sheet No.10

## Adaptation Game (continued)

Hedgehog

| | | |
|---|---|---|
| I eat slugs, snails and insects | I have prickles | I hibernate |
| I am nocturnal | | |

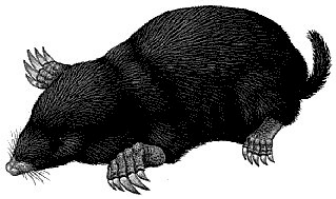
Bat

| | | |
|---|---|---|
| | | I eat insects |
| I have wings | I hibernate | I am nocturnal |

# Activity Sheet No.11

## What am I?

Use the key to identify these mystery animals. Identify each animal in turn and write the name of each one underneath their picture.



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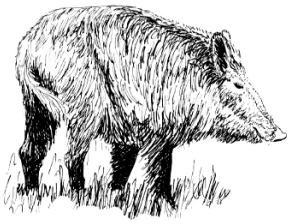

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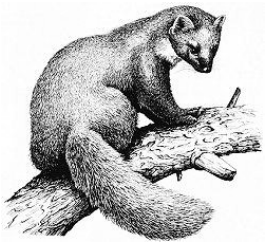

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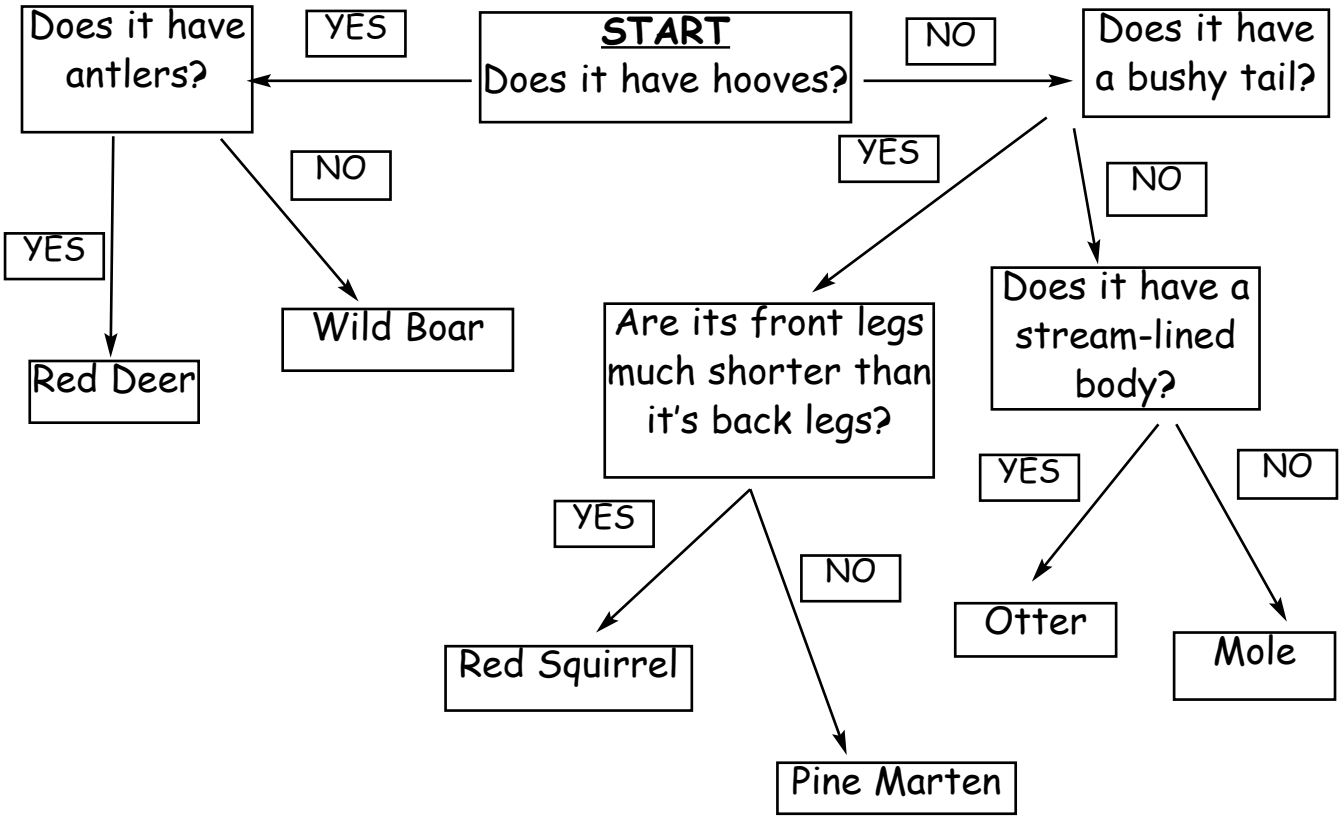

# Activity Sheet No.12

## Create your own Creature

Use what you have learned about adaptation to create your own imaginary creature. Choose an environment and lifestyle for your animal and then think about the physical and behavioural adaptations it would need to survive. Draw a picture of the animal in the box below and write about the adaptations in the space provided.

My chosen creature is a_____(think of an imaginary name). It lives in _____ (describe an environment).

Adaptations (please list as many as you can)

1. ---
2. ---
3. ---
4. ---
5. ---