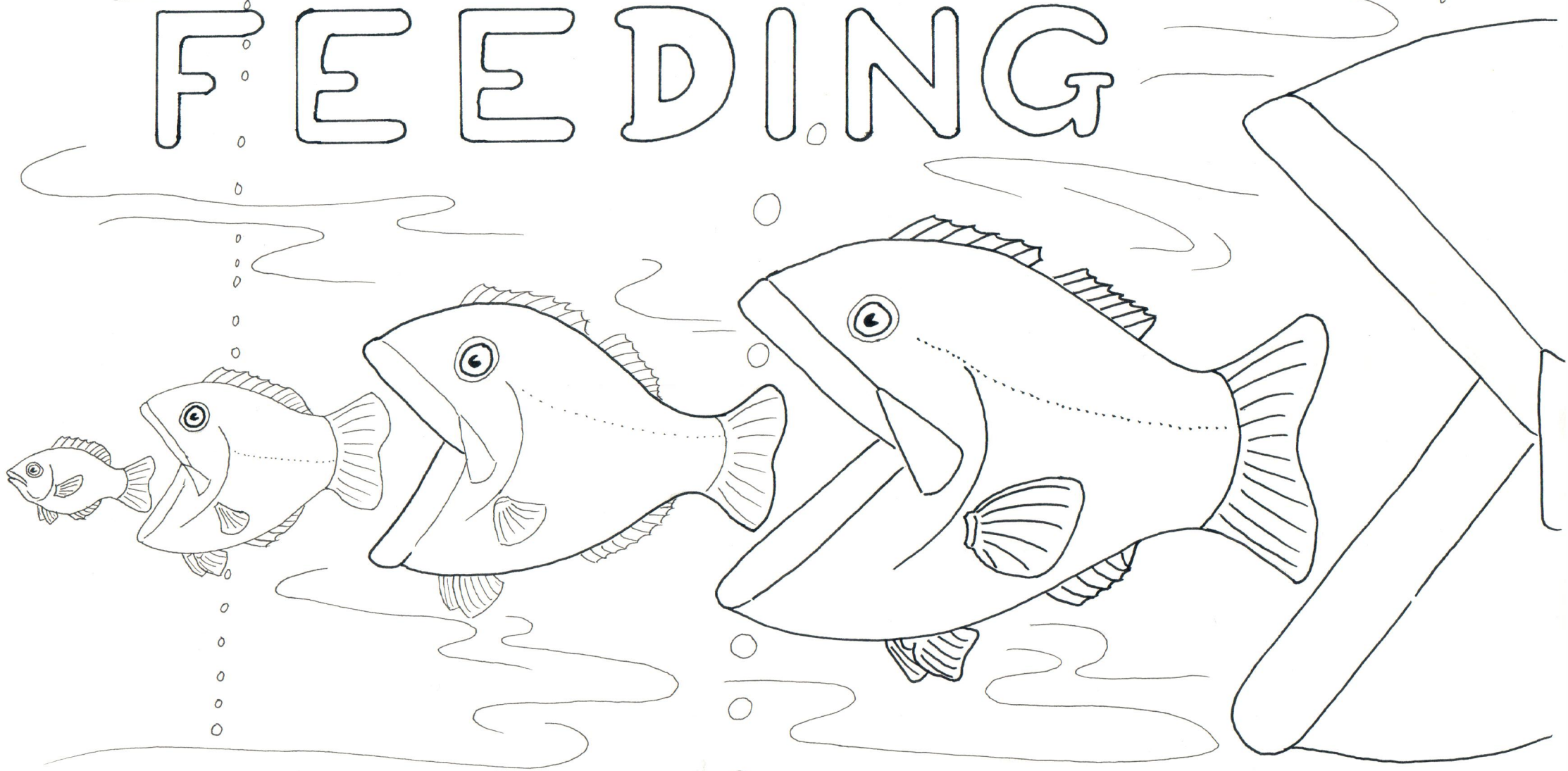
FOOD AND FEEDING



A Teachers Guide To Animal Feeding Adaptations.

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Introduction.

This guide, for teachers of pupils in Key Stages 2 and 3, aims to provide information and ideas on food and animal adaptations to eating (covering AT3 of the science curriculum).

PAGE CONTENTS

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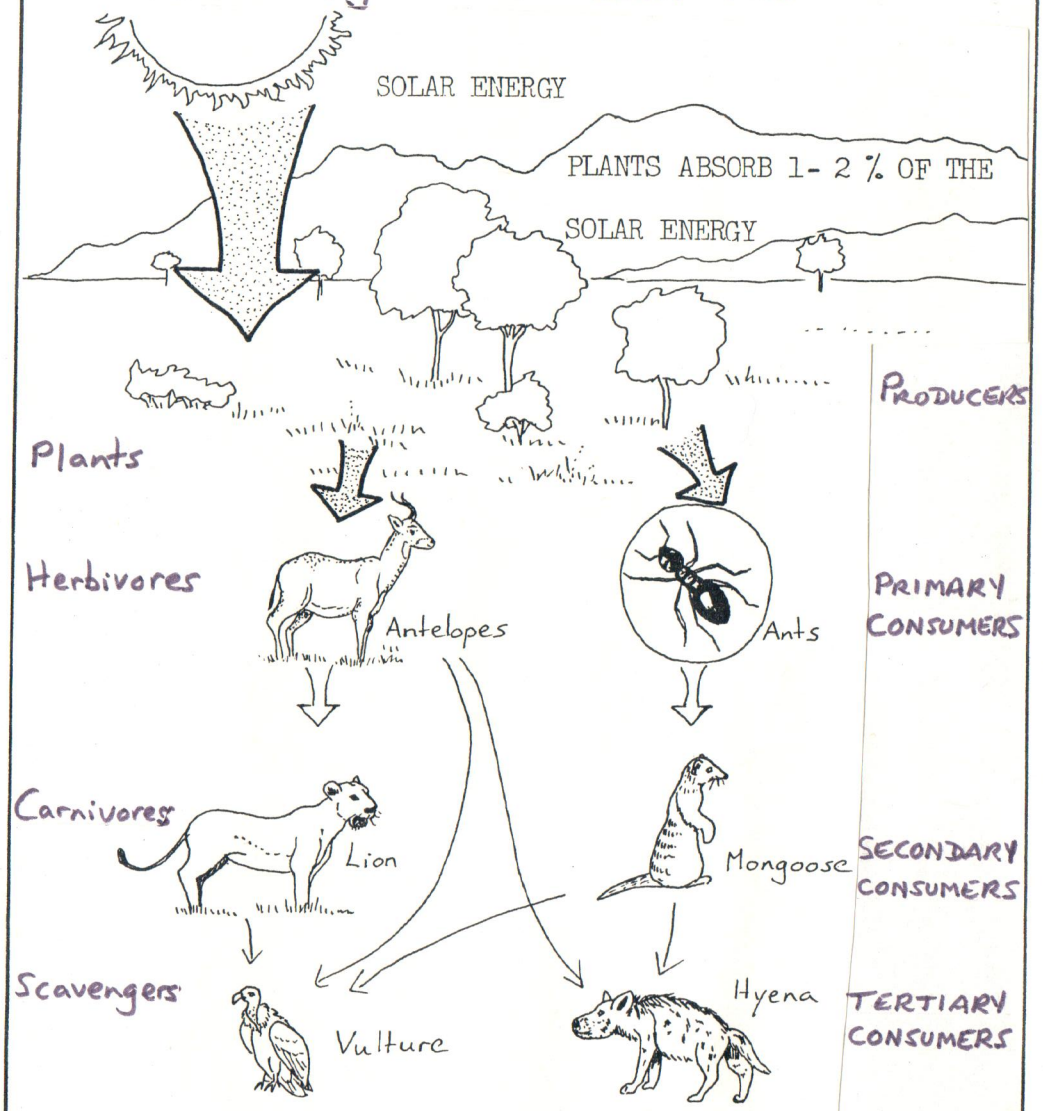
Basic Food Facts.

Animals eat food to obtain energy to keep alive. The source of all this energy is the Sun, and it passes along a chain of organisms with some being lost at each link.



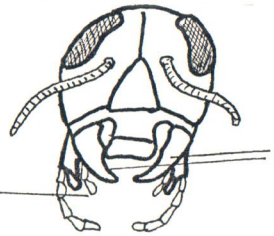
So the higher the link in the chain, the fewer animals can be supported.

Feeding Adaptations.

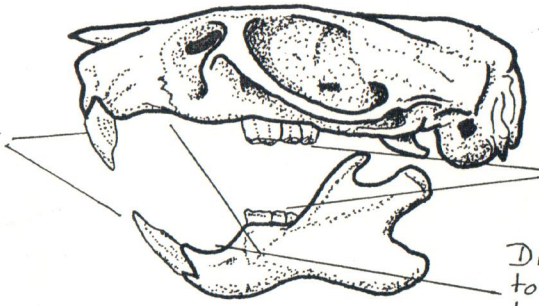
PRIMARY CONSUMERS - are animals which only eat plant material, they are also called HERBIVORES.

Plants are not easy to digest, so they must be cut, crushed and broken down to obtain as much energy from them as possible.

MANDIBLES - plant-eating insects have scissor-like mouth parts.



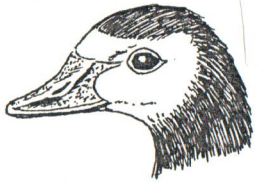
TEETH - have to be specially adapted to cutting and grinding plant material. Due to constant grinding the teeth wear down. Some animals get round this by having continually growing teeth eg. Rodents, Sheep. Or by replacing worn sets with new ones throughout life eg. elephants have eight sets of teeth.



BEAKS

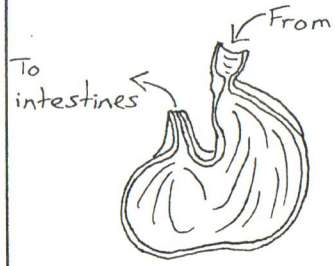

Parrot

Parrots feed on seeds and nuts, so have strong, broad beaks to crack open the hard cases.

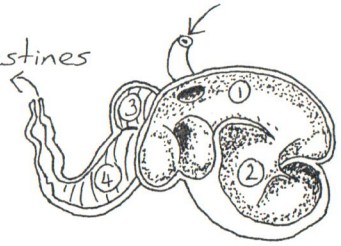

Barnacle Goose

Many geese feed on grass, so have short, scissor-like beaks with serrated edges.

DIGESTION - normally stomachs have one chamber, but ruminants (eg. cows) have a four chambered stomach and chew the cud to extract as much energy as possible.



HORSE STOMACH



ANTELOPE STOMACH

Chewed food enters into the 1st chamber and is chewed again. The food then passes through the other three chambers.

Birds have no teeth, so some swallow grit and pebbles to help grind the plant material eg. Emu.

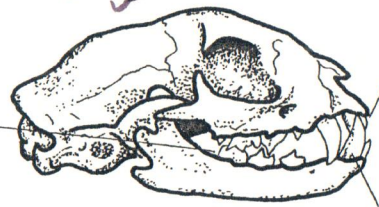
Rabbits get the most from their food by eating their droppings - so their food gets digested twice.

Some monkeys feed only on leaves, so they have large sacculated stomachs containing bacteria which break down the plant material releasing energy eg. Colobus.

More Feeding Adaptations.

SECONDARY CONSUMERS - feed on other animals. They are often called CARNIVORES.

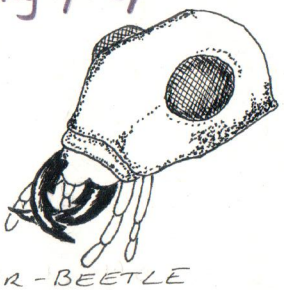
Teeth are shaped for stabbing, ripping, tearing and crushing.



SKULL OF A CAT.

Cats have few chewing molars, so they have a very rough tongue to rasp at the food.

MANDIBLES - large, pointed and barbed for seizing and rending prey.

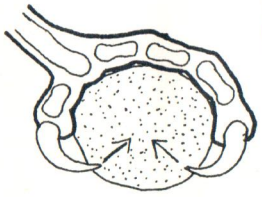


TIGER-BEETLE

BEAKS are hooked and sharp.

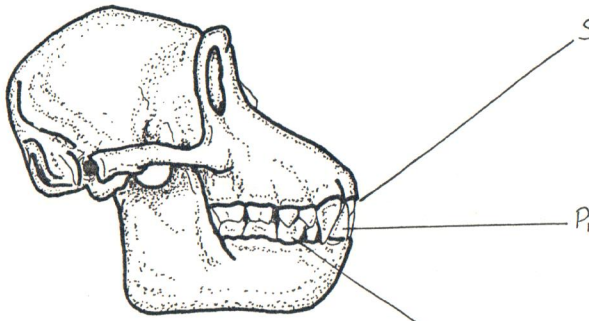
AFRICAN FISH EAGLE.

FEET are adapted too.



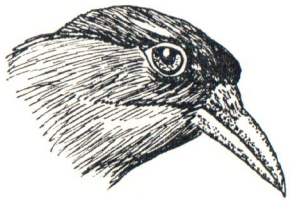
Strong and sharp, the hooked talons stab inward when the foot closes.

Other secondary consumers are called OMNIVORES. These feed on both plants and animals, so their teeth / beaks are not particularly specialised.



CHIMPANZEE SKULL

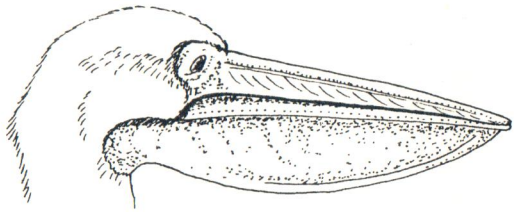
CROW.



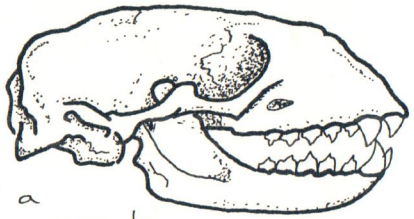
Average size and shape beak enables the crow to feed on many types of food.

Feeding In Water.

The PELICAN has a pouch of skin on the lower jaw which acts as a fishing net. Most fish-eating birds have long, sharp beaks, often with serrated edges and hooked tips.

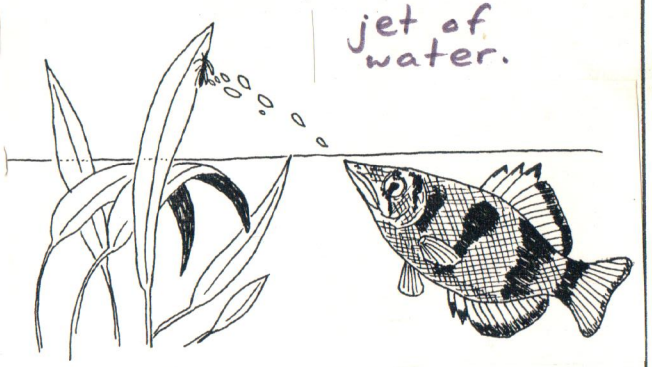


SEA LIONS have very sharp teeth for catching fish.



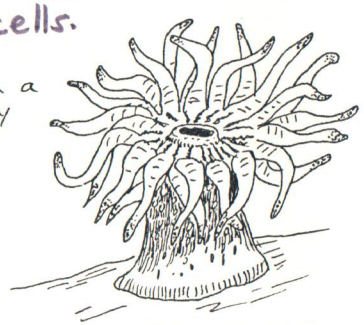
Skull of a Californian sea lion

ARCHERFISH catch insects by knocking them down with a jet of water.

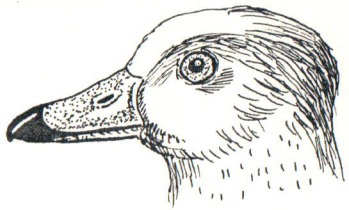


SEA ANEMONES catch prey with their tentacles which are covered with tiny stinging cells.

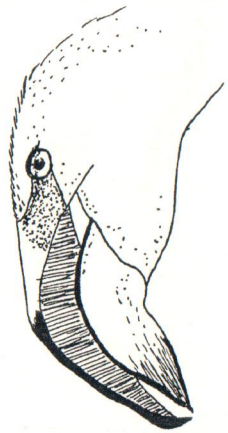
Once caught on a tentacle, the prey is manoevered to the central mouth.



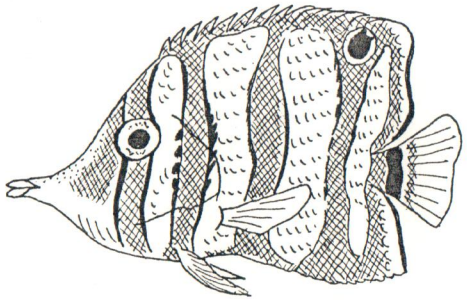
Many DUCKS feed on small particles on the water surface. So they have flat bills for dabbling.



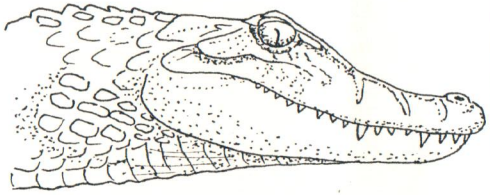
FLAMINGOS filter feed on small shrimps (krill) and algae.



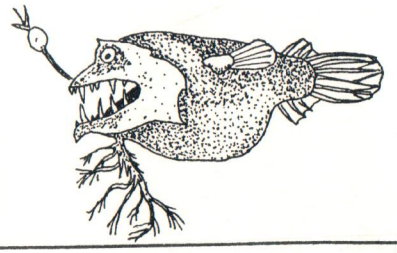
BUTTERFLY FISH daintily pick algae off coral with their elongated mouths.



CROCODILES have a long jaw and very sharp teeth for catching fish.



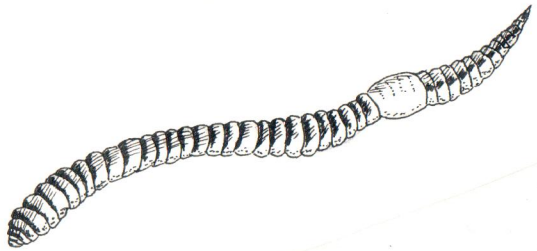
In deep, dark oceans ANGLERFISH attract prey to them with a luminescent lure.



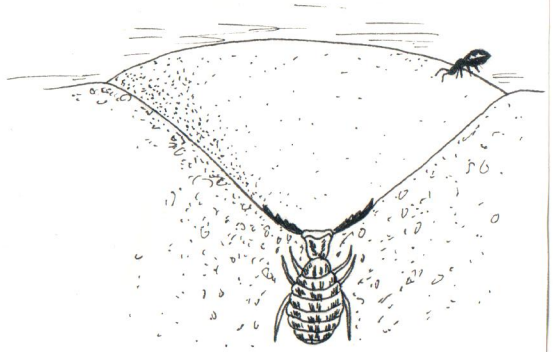
Feeding In The Soil.

Soil provides a food source, many animals are adapted to live and feed underground.

EARTHWORM - burrows through soil feeding as it goes. All organic material (vegetable and animal) is digested and only inorganic material (minerals etc) is ejected.



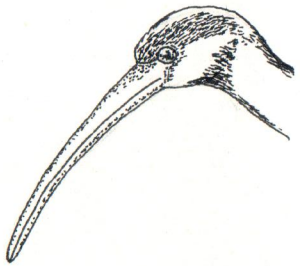
EUROPEAN MOLE - body shape and spade-like front feet are ideal for burrowing. Teeth are small and sharp for eating worms, grubs etc.



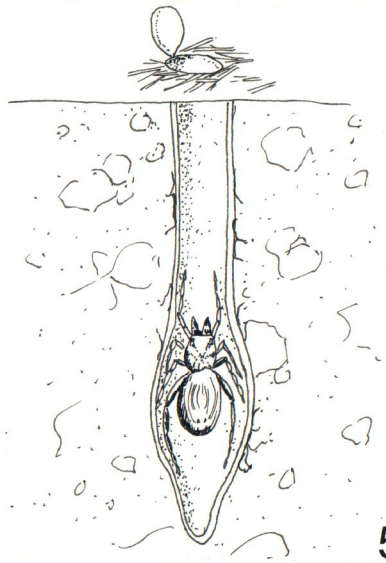
ANT LION - the larva of this insect digs a funnel-shaped crater in sandy soil, and waits for its prey to fall in towards its open jaws.

POCKET GOPHER - adapted for subterranian lifestyle by having a thickset, tubular body, short and powerful forelimbs, and a naked, touch-sensitive tail. Both upper and lower incisor teeth stick out even when the mouth is closed, so they can cut roots or dig without getting soil in the mouth.

IBIS have long, thin curved beaks for probing in soft soil and mud for any invertebrates there.



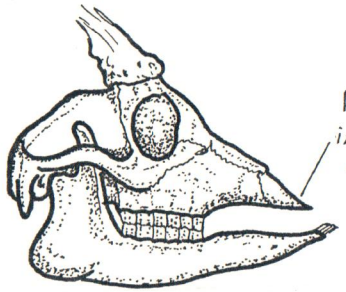
TRAPDOOR SPIDERS live in silk-lined burrows covered with a silken, hinged trap door. The spider waits for prey to disturb the web, and then springs out to catch it.



Feeding At Ground Level.

Many animals are adapted to feed off ground cover plants which are in turn eaten by predators.

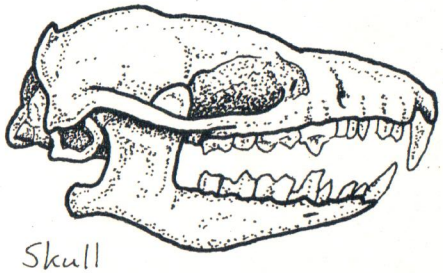
DEER bite off their food between the lower incisors and a callous pad on the upper gum. The premolars and molars are used for chewing the cud.



Roe Deer. Skull.

ELEPHANTS can not reach the ground with their mouths, so they use the trunk (which is an elongation of the nose and upper lip) a bit like a hand to place food in the mouth.

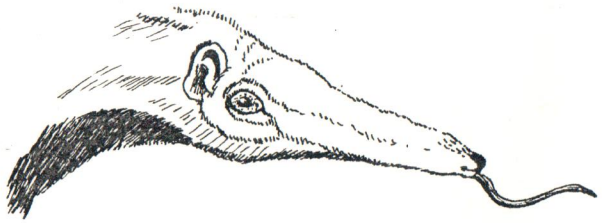
HEDGEHOGS feed on a variety of invertebrates. The first upper incisors are separated by a wide gap into which the blunt, forward-projecting lower incisors fit. So when the jaw closes on an insect the lower incisors scoop it upwards between the upper teeth to impale it.



Hedgehog Skull

PRAIRIE DOGS are rodents which feed on ground cover plants. They live in underground colonies (coteries) which provide refuge from predators.

ANTEATERS have no teeth, but their long, narrow tongue covered with tiny backward-pointing spines and sticky saliva is great for licking up ants and termites.

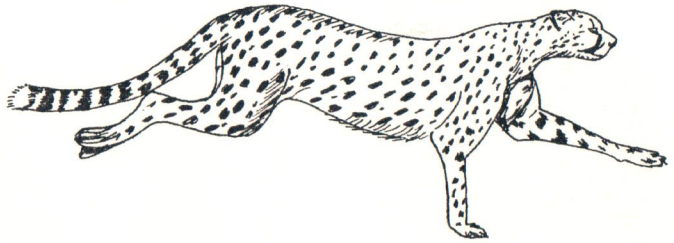


Many predators are adapted for hunting the ground-dwelling herbivores.

LIONS - the females hunt together encircling the prey and cutting off its escape routes.

CHEETAH - hunts alone using a stalk-and-rapid chase technique. They can run in short bursts at up to 60 mph.

PRAIRIE FALCON - flys along at a few hundred feet ready to strike at small mammals and birds on the ground. The attacking bird is flying so fast that if it misses it may tumble over on the ground.



Feeding In Trees.

A lot of food can be found in trees, so many animals are adapted to live and feed in trees.

PARROTS are excellent climbers. Their feet are adapted for gripping with two toes forward and two toes back.
Using their beaks as well as the feet, they are well suited to climbing around dense foliage.

NORTH AMERICAN PORCUPINES are very good at climbing trees. They have strong, sharp claws with unfurred soles for clinging to tree trunks.
They have well developed incisor teeth to feed on bark and conifer needles.

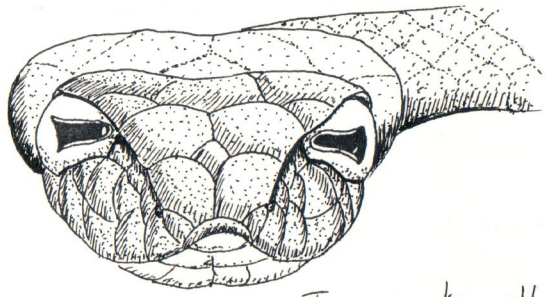
Pygmy marmoset gouging tree for sap and gum.

MARGAY – small size, light weight and long tail and claws help this excellent climber to hunt birds and monkeys in the rainforests of S. America.

MARMOSETS are small South American monkeys which have claws instead of toes to help them cling to tree trunks, and specially adapted teeth for gouging holes in bark to feed on sap and gums.

GIRAFFES can reach food with their long legs and necks. The leaves are pulled off the trees with a long tongue (up to 46cm) and combed off shoots using their splayed-out canine teeth.

Arboreal (tree dwelling) SNAKES tend to have large eyes to help find their prey.
Most ground-dwelling snakes have poor vision.



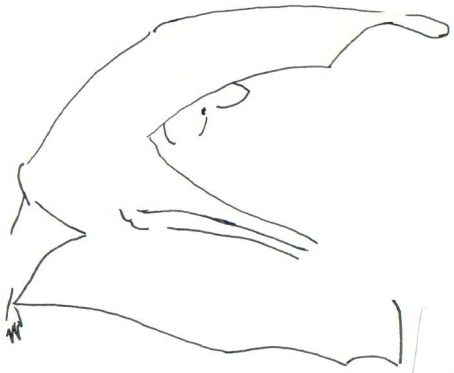
Tree snake with front-facing eyes.

Feeding In The Air

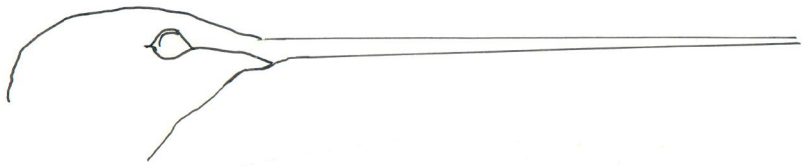
SWALLOWS - feed entirely on insects by scooping through a cloud of them or by catching them individually with the slender, pincer-like beak.

SPARROWHAWK - has a long tail and short, rounded wings with deeply slotted primary feathers which gives this bird amazing speed and agility to manoever through trees as it dashes after its prey, snatching it in mid-air.

NIGHTJAR - feeds on insects at dusk It has an enourmous mouth, fringed with touch-sensitive bristles, which acts like a scoop as it flys after its prey.



BATS have superb hearing and hunt using echolocation so they are able to avoid obstacles and catch insect prey in the dark.



HUMMINGBIRDS feed on nectar and have long slender bills often with brush-tipped tongues. They feed while hovering in the air, their wings beating so fast that they are just a blurr and make the humming noise that gives them their name.

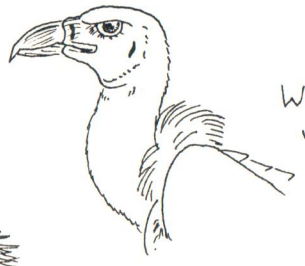
SERVAL. This African cat feeds on small mammals and birds by waiting and springing on them.
They can catch flying birds by leaping up and hitting them with the forepaws.

Natures Dustmen.

Left-over food doesn't just lie around in mounds; so where does it all go to?

VULTURES soar around looking for carcasses. They have long hooked beaks to tear flesh, and they have bare heads and necks to prevent the plumage getting clogged up with blood.

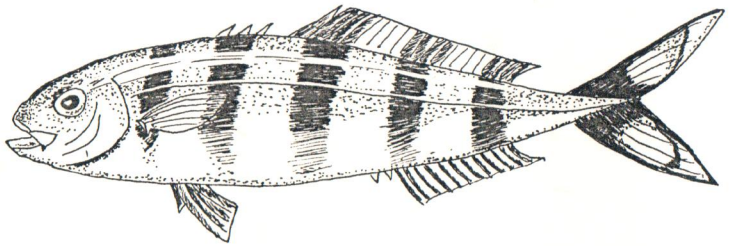
White headed vulture



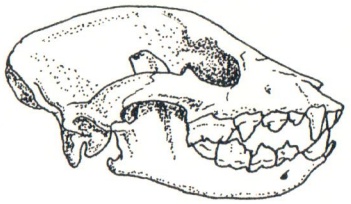
White backed vulture.

Egyptian vulture – is feathered as it eats scraps flung aside.

PILOT FISH are often found near sharks and rays. They feed on scraps left by these fish and will swim in and out of their mouths and gills cleaning up the bits.



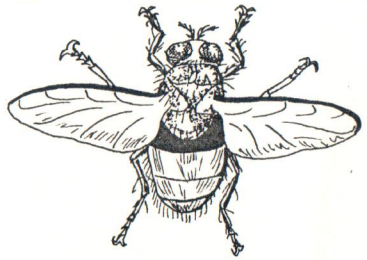
HYENAS have massive, robust skulls which have a powerful grip. The large premolar and carnassial teeth help to crush bones.



Skull of the Spotted Hyena.

DUNG BEETLES make balls of dung as a food supply for their young, and roll them one at a time to an underground brood chamber where an egg is placed in each one. The beetle runs backwards pushing the ball with its back legs.

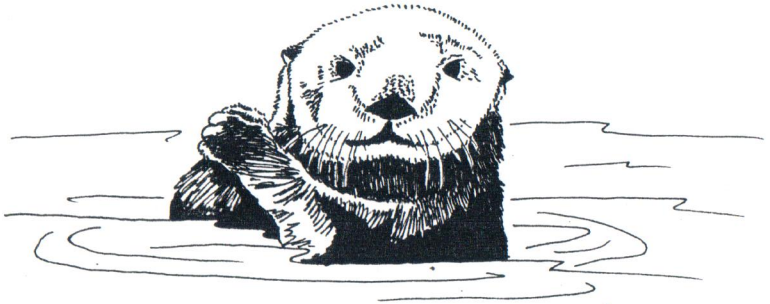
FLYS.
Some lay their eggs in dung, some in rotting carcasses, others in decaying fruit and vegetation. Their young (maggots) hatch out into a food supply and so they help to decompose waste material.



Using Tools.

Not all foods are easy to get at, some animals have found that using tools makes the food more accessible.

SEA OTTERS place flat stones on their stomachs and use them as anvils to break open mussel and clam shells. They will also grasp a stone between the forepaws and bang it against the edge of an abalone shell to dislodge it.



GALAPAGOS WOODPECKER FINCH uses cactus spines for reaching grubs in tree cavities.

EGYPTIAN VULTURES pick up stones in the beak and throw it at ostrich eggs to crack open the hard shell.

CHIMPANZEES are very intelligent animals which use a variety of tools in a variety of situations. To feed on Driver Ants they find a long stick which is lowered into ant nest then they wait for the ants to crawl up it and then sweep them off into the mouth before they bite. For termites, chimps use supple grass stems - the soldier termites bite the stem and cling on long enough to be eaten by the chimp. They also use sticks and stones to crack open shells too hard to be bitten open, and they make sponges of chewed bark or leaves to drink water from.

THRUSH.
This bird uses a large stone, even concrete doorsteps, on which it knocks snails against to crack open the shell and get the occupant out.

HUMANS use many tools to catch and kill prey; this makes up for not being specialised for hunting.
Egs. spear, bow and arrow, bolas, gun, traps, fishing net, boomerang etc.
Not only do humans use tools to catch and kill prey but they also use tools to help them eat
Egs. knife, fork, spoon, chopsticks.

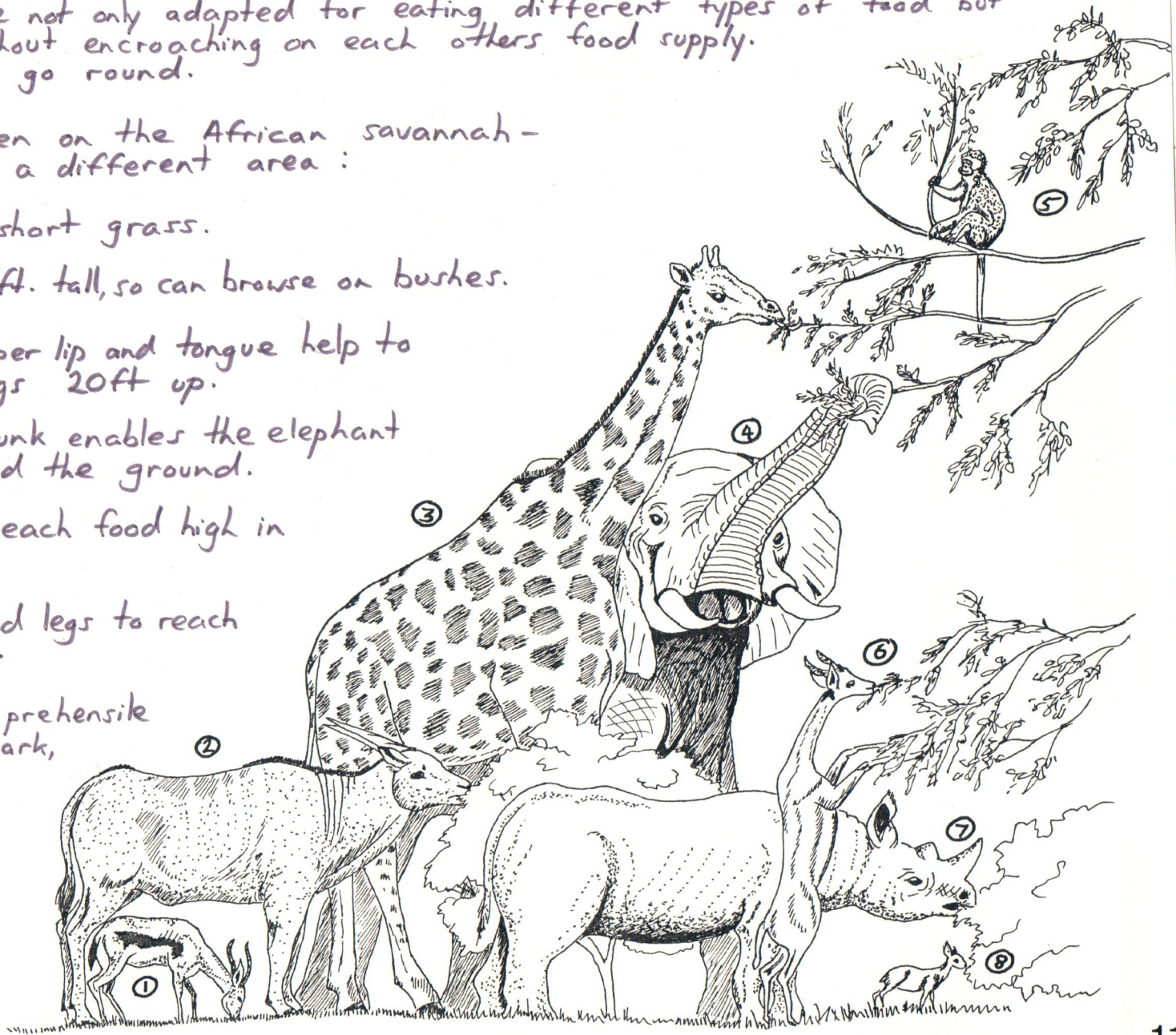
Competition For Food.

Animals in their habitats are not only adapted for eating different types of food but also to eat similar food without encroaching on each others food supply. So there is enough food to go round.

This can be clearly seen on the African savannah - each species exploits a different area:

1. Springbuck - grazes on short grass.
2. Eland - stands almost 6ft. tall, so can browse on bushes.
3. Giraffe - height, long upper lip and tongue help to collect leaves and twigs 20ft up.
4. Elephant - dexterous trunk enables the elephant to feed from trees and the ground.
5. Vervet monkey - can reach food high in the tree tops.
6. Gerenuk - stands on hind legs to reach higher up in the bushes.
7. Black rhinoceros - has a prehensile upper lip to help feed on bark, twigs and leaves.
8. Dik dik - small size for feeding on foliage low down on bushes.

Look at animals in other habitats and see if they compete for food - eg. Lakes, Woodland, Desert.

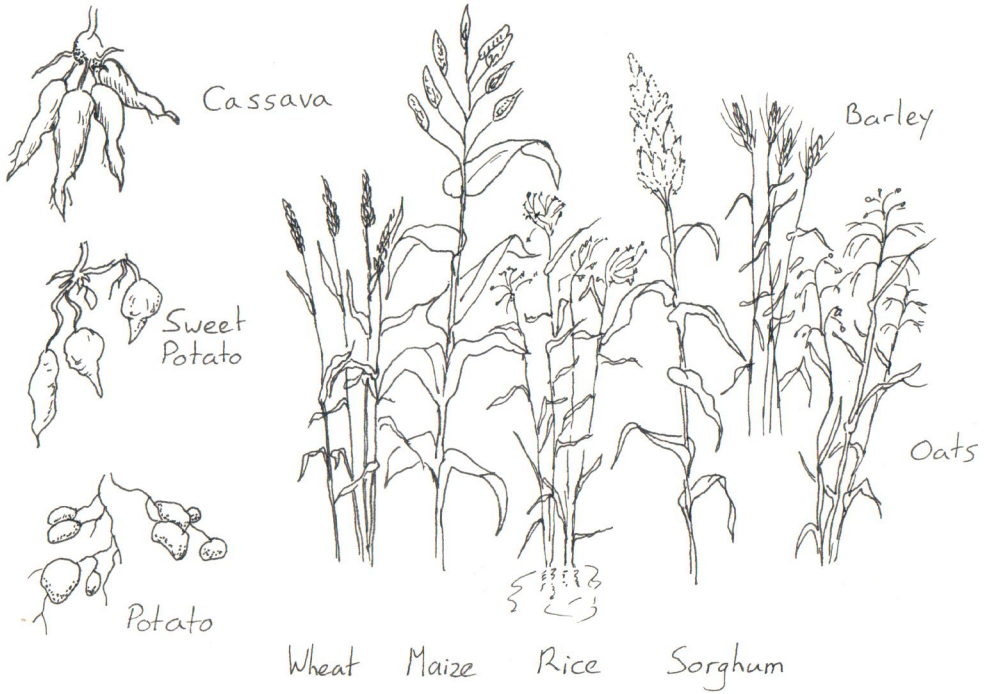


Our Food.

Look at your own teeth - they show us that we are omnivores, but that vegetation plays a large roll in our diet (we've got flat molars). To live healthily we need to have a balanced diet with enough energy, vitamins, minerals, trace elements and roughage to keep our bodies in good condition.

STAPLE DIETS -
these are the main bulk of your food.

Europe and North America - wheat, oats, barley.
Eastern Asia - rice (the staple diet of more than half the world).
South America - potatoes, cassava, maize.
Africa - cassava, sorghum (millet) and maize.



Many people have different diets due to CUSTOMS AND RELIGIONS:

Gauchos - nomads of S. America. Before Western civilization influenced their culture, hardly any of them ate any vegetable matter; they had a staple diet of meat.

Masai - nomadic herdsmen of Africa. Supplement their diets with a mixture of milk and blood from their cattle. This part of their diet is rich in protein and energy.

Buddists are vegetarians, as it is against their religion to eat meat (they believe in reincarnation).

Jewish people do not eat any food which comes from the pig, as this would go against their religion.

Hindus do not eat meat from cattle, as cows are sacred to them.

Things To Do...

at school

WRITE stories / poems about being a herbivore (eg. a giraffe or deer) or a carnivore (eg. a lioness or crocodile).

COMPARE animal diets with your own.

PLACE various tools and utensils on a table eg. tea strainer, meat hook, fishing net, spade. See if you can find an animal with an adaptation equivalent to the tool.

Make CHARTS and graphs on what the class eats during a day or even a week. What's the most popular food?

MAKE animal masks with beaks, teeth, trunks, tongues etc.

DRAMA - mime different ways of catching prey. Stalking and chasing, swooping, hiding, waiting etc.

Make a food pyramid : eg. 1 BUZZARD
2 WOLVES
10 DEER
100's of PLANTS.

CREATE a wild bird feeding station in your school grounds. This can be hanging bird feeders or a bird table, or if you have the space why not plant native trees, shrubs and wild flowers which provide food such as fruit, seeds and berries.

at the park

Make feeding adaptation charts and fill them in : Eg.

ANIMAL	FOOD	ADAPTATION.
Otter	Fish Frogs	Sharp teeth Whiskers Streamlined body for swimming.
Eagle	Animals	Sharp, hooked beak. Sharp talons. 
Duck	Pond weed + insects	Flat beak 
Frog	Insects	Long sticky tongue.

Look at how ducks, geese and swans get round the problem of competing for food.

Draw different beak shapes.

Choose 5 animals eg. Snake, Penguin, Deer, Parrot, Chimp. Watch them feed. Do they chew the food, take small bites, swallow it whole etc.? Discuss reasons for this.

What do the animals eat in the wild?
What do they eat at Penscynor?

Why not eat your lunch at Penscynor and watch each other.
Look for differences in food and in eating behaviour - who eats the most, who eats the least, who eats the fastest etc.?

Penscynor Wildlife Park Handy Plan

Useful Locations

The Zoo Centre is located next to Penguin Pool (7), between Burger Bar (4) and Waterfowl aviary (25)

1. Main Office
   First Aid Point
   Gift shop
   Copper Kettle Coffee Shop
2. Toilets
3. Toy Shop
   Ice-Creams
4. Burger Bar
5. Book shop / Sweet shop
6. Picnic Area

Enclosure key

□ - Mammals △ - Birds

In the unlikely event of an Emergency (fire/ bomb scare/ animal escape). Stay calm. Make your way as quickly as possible to either point A or point B where staff will be on hand to escort you from the park.

Alpine Slide
Playarea
Lookout / Trout
Lorries / Macaws
Parrot House
Zoo Centre
Way In
Bumpa Boats etc.
Pets Corner
Tropical House
Car Park
Old Macdonald's Farm
A
B

7. Penguins
   Pelican
8. Waterfowl
   Trout
   Squirrel Monkeys
9. Chimpanzees
10. Scarlet Ibis
    White Fronted Wood-Duck
11. Empty At Present
12. Meerkats
13. Shetland Pony
    Guanaco
    Deer
14. Black & White Ruffed Lemurs
15. Emperor Tamarin Island
    Trout
16. Rheas
17. African Crowned Crane
18. Wallabys
    Muntjac
19. Marmoset House
20. Prairie Dogs
21. Pygmy Goats
22. Empty at present.
23. Lar Gibbons
24. Ring-Tailed Lemurs
25. Sacred Ibis
    Night Herons
    Silver Gulls
    Demoiselle Cranes
26. Sooty Mangabeys
27. Asian Short-Clawed Otters
28. Hillside Parrot Aviaries
29. Flamingos
30. Porcupines
    Mongooses
31. African Fish-Eagle
32. Eastern Black and White Colobus
33. Dourocouli Monkeys
34. Mixed Aviaries
35. Farm Animals
    Rabbits
    Guinea Pigs
    Polecats
36. Mixed Aviaries