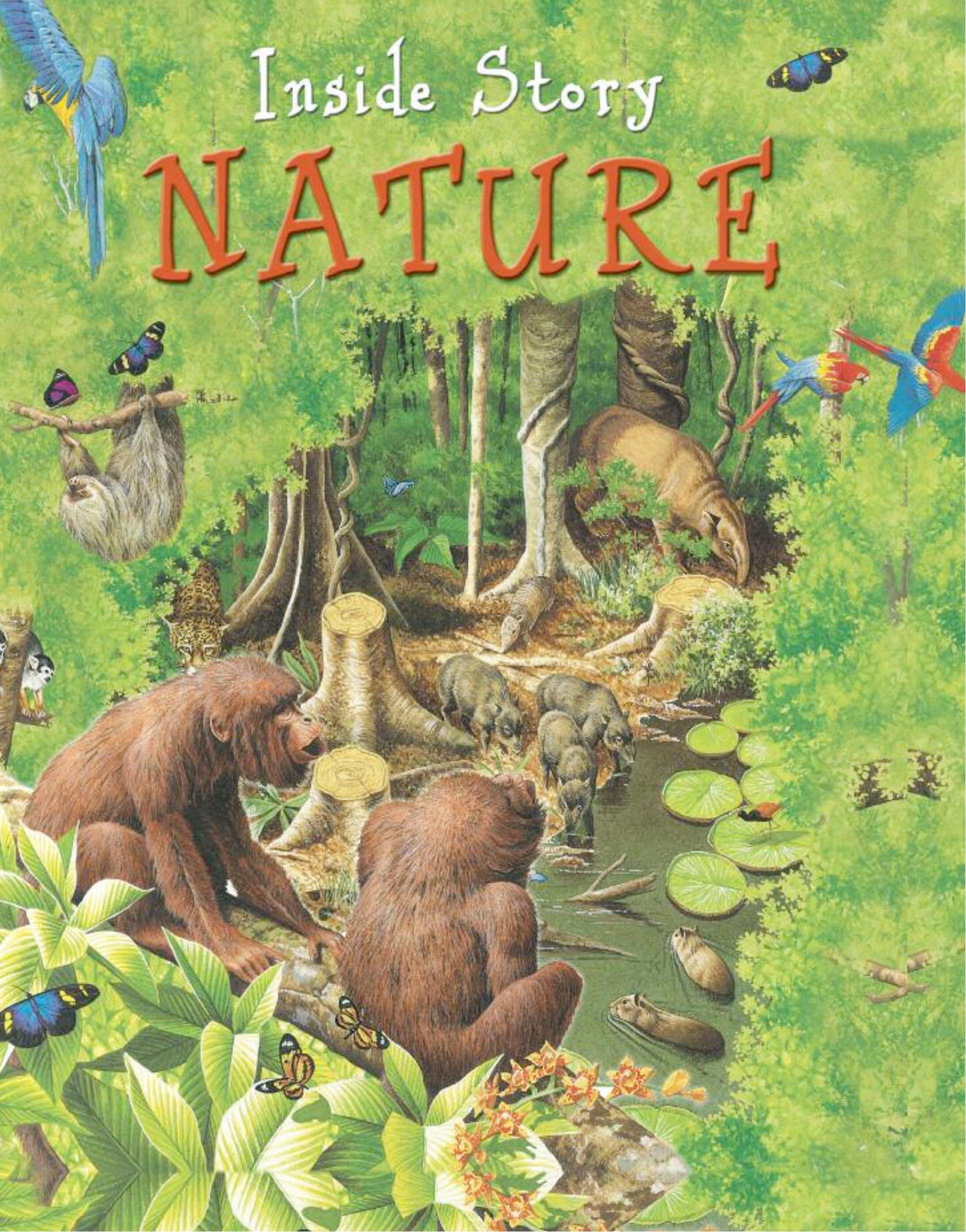


Inside Story

# NATURE



Inside story  
NATURE



Illustrated by Ian Jackson

 Orpheus

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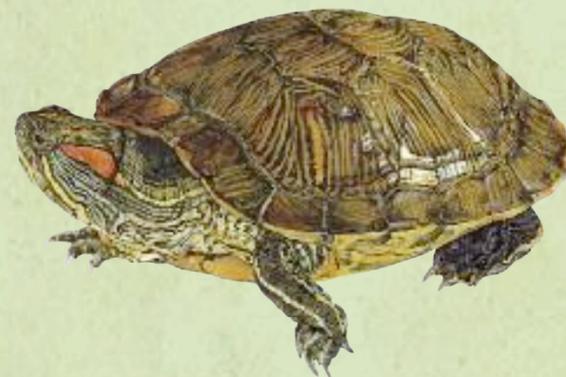
Illustrator Ian Jackson

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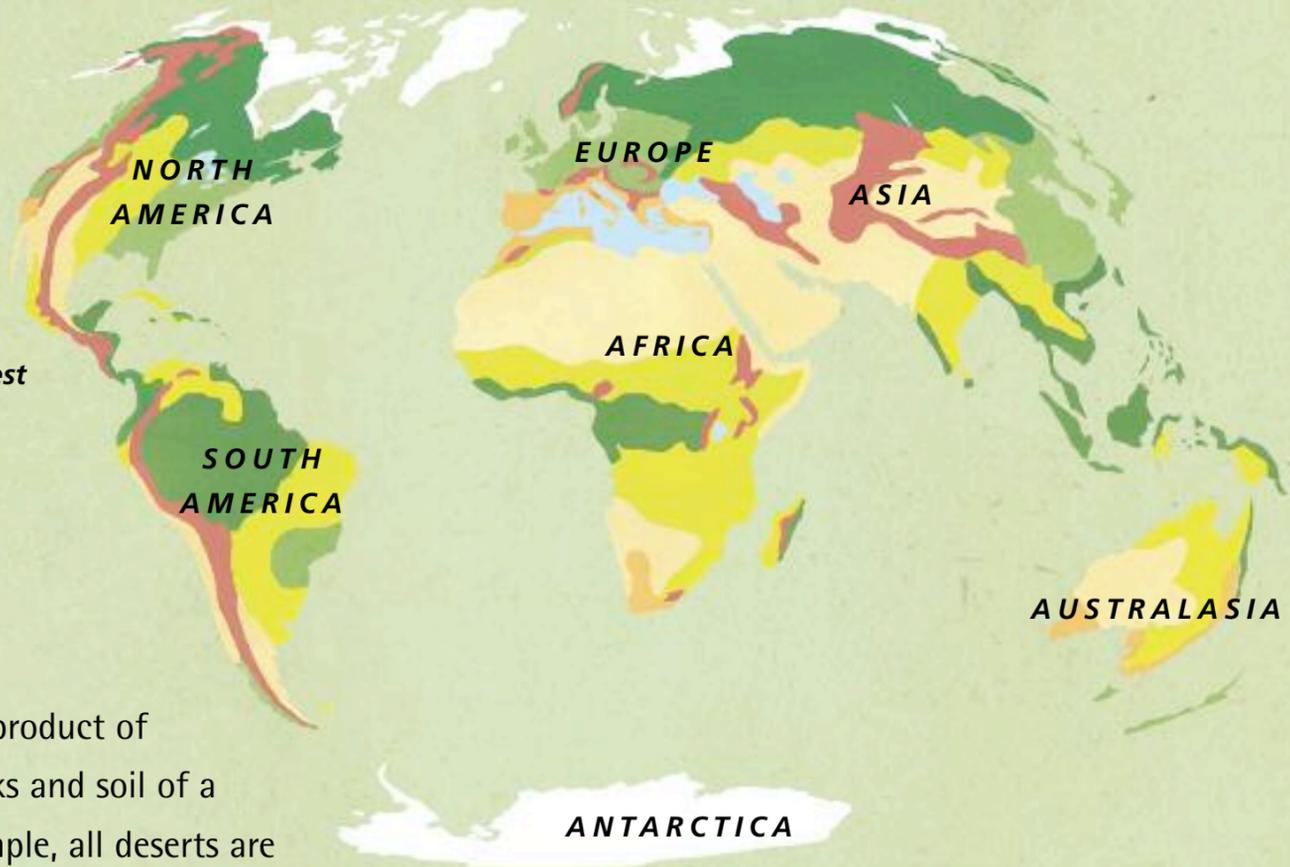


# The natural world

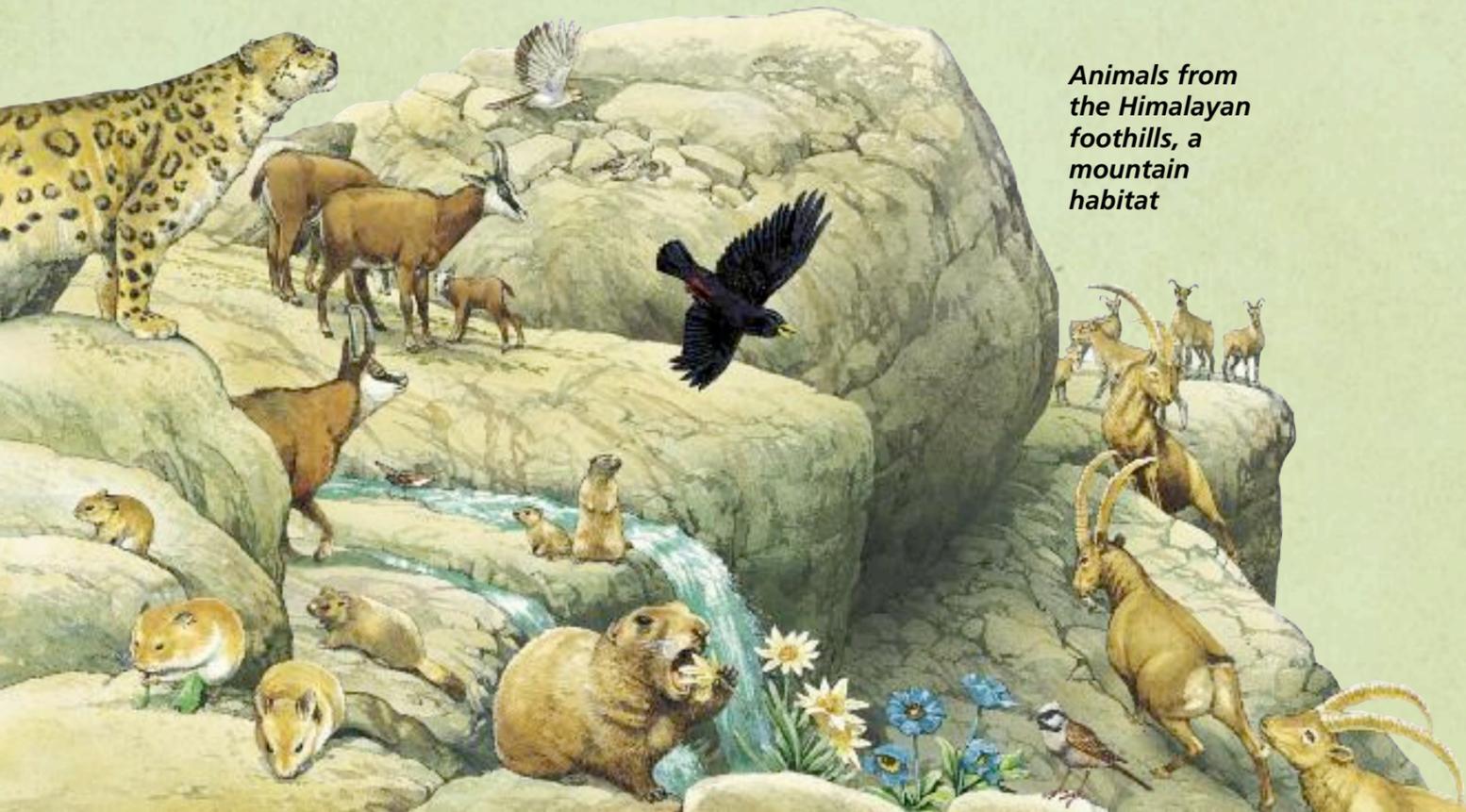
Living things hardly ever live on their own in the wild. To survive, they must interact with other animals and plants, satisfying their need for nourishment and, in many cases, protection. Living things that rely on each other in this way form what is known as a community. A community's natural home may be small, like a pond, or it may be extensive, like a forest. These are known as habitats. A very large group of habitats that are generally similar to one another are called biomes. Desert, tropical rainforest and woodlands are all examples of biomes.

### World biomes

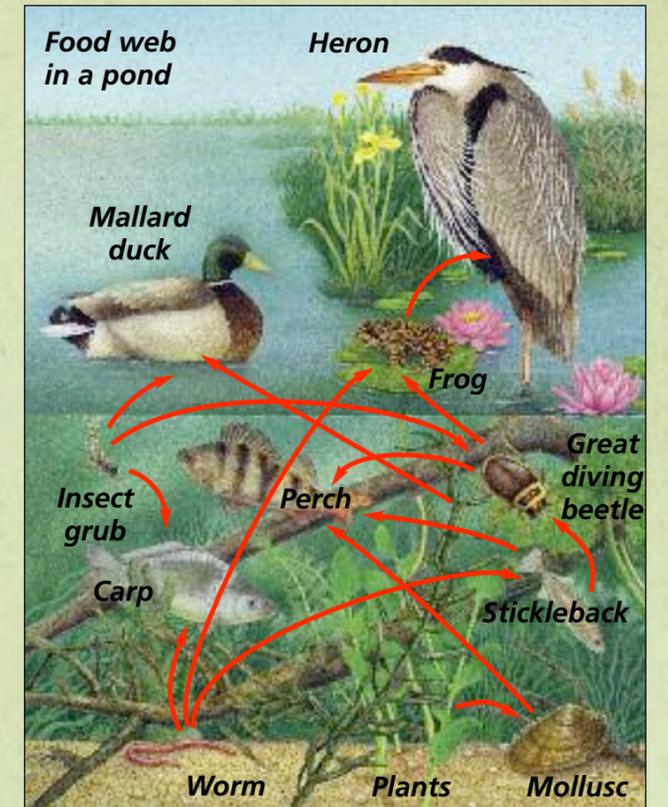
-  Ocean
-  Woodland
-  Taiga
-  Grassland
-  Scrubland
-  Tropical forest
-  Desert
-  Mountain
-  Polar region



Biomes are the product of the climate, rocks and soil of a region. For example, all deserts are dry, while rainforests grow where the climate is hot and wet.



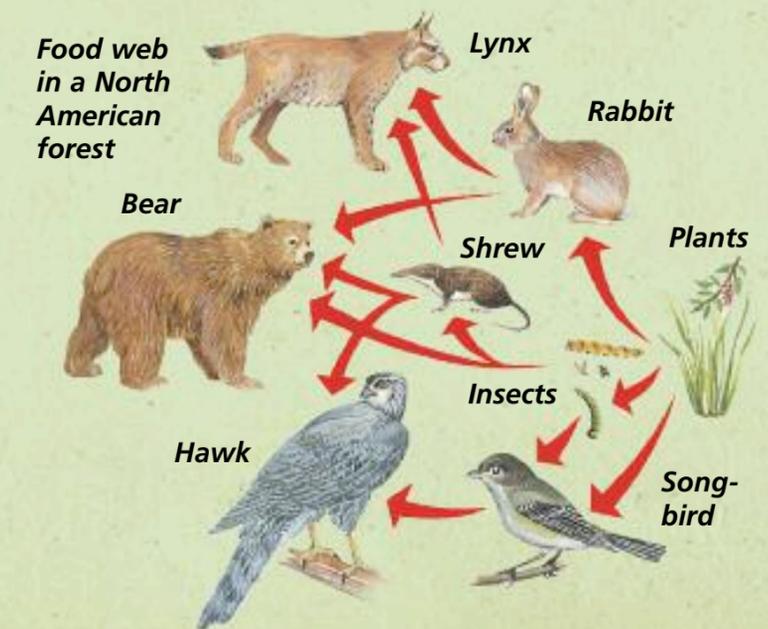
*Animals from the Himalayan foothills, a mountain habitat*



This is the INSIDE STORY of nature. Discover how animals live in the main world biomes –woodland, savannah, desert, tropical rainforest, oceans and polar regions—and then probe a little further to discover some hidden worlds...

Some animals have learned to live in habitats that humans have created, such as towns and cities. Birds use roofs, gutters and chimneys as roosting and nesting sites, instead of cliffs and trees. Rubbish produced in a town or city also attracts animals such as rats, foxes and gulls, which scavenge from the rubbish.

Within each community, herbivorous animals eat plants and carnivores eat other animals. Omnivores, such as humans, eat both. The pattern of what different animals feed on in a certain place is called a food web.



### SQUIRRELS

During the summer months in the wood, squirrels and other rodents feed on fruit and nuts from the trees. In winter, food is more difficult to find, so in autumn, squirrels bury seeds and acorns, to eat in the winter.

Wasps' nest

### WOODLAND HUNTERS

Resting during the day in its burrow, the red fox emerges at night to prey on small woodland mammals such as rabbits, mice and voles. Stoats are also skilled predators, often taking on animals bigger than themselves. They kill by delivering a bite to the back of the neck. Stoats also take birds, eggs and insects.

## Woodland

Woodlands once covered the temperate lands of the Northern Hemisphere. Much woodland has vanished, to be replaced by farmland and cities.

The seasons have a great effect on woodland life. At the onset of winter, the trees lose their leaves, many birds fly away to warmer lands and some animals hibernate. Winter stayers survive on stores of fat, nuts and seeds by feeding on the ever-present lice and worms in the soil, or by hunting other animals.

Grey squirrel

Great tit

Hedgehog

Garden spider

Fly agaric (toadstool)

Ground beetle

Vole

Purple emperor butterflies

Wood ants

Snail

Red fox

Goldfinch

Blue tit

Bumblebee

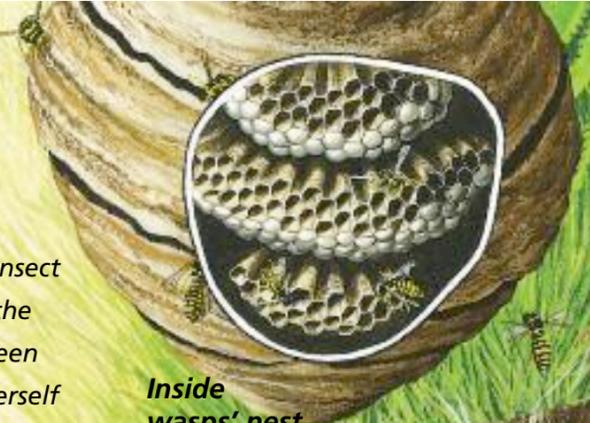
Nightingale

Stoat



### PAPER NEST

Some wasps build nests from paper made out of chewed-up wood. These wasps bring their insect prey to the nest to be fed to the grub-like wasp larvae. A queen wasp finds a nest site by herself and raises the first brood of workers. The workers then continue the nest-building and other tasks.



Inside wasps' nest

Tiger beetle larva

### SOIL LAYERS

Soil has many different layers. On the top is leaf litter with old leaves, twigs and feathers. Below is topsoil, rich in decaying remains of plants and animals, and home to small soil creatures. Next is the subsoil, where the roots of bushes and trees grow for firm anchorage. Rock fragments in the soil get bigger until they form solid bedrock beneath the soil layers.

Inside ants' nest

Earthworm

Rabbit kittens

Mole (with earthworm)

Dormouse

## Soil dwellers

Woodland soil teems with life. Worms carry dead leaf fragments into the soil, where bacteria and fungi break it down into nutrients. Ants lay their eggs in underground nests. Tiger beetle larvae catch small insects from their holes. Rabbits and dormice sleep in burrows. Moles tunnel through the soil feeding on worms.

### ANT'S NEST

An ants' nest is a maze of tunnels and chambers underground, where the queen ant lays her eggs. When a young ant is large enough, it spins a cocoon around itself. Inside it changes into an adult ant. The first eggs hatch into worker ants. Workers are females that cannot mate. They keep the nest clean and find food. Later on, winged males and females hatch. They fly out of to mate. The females become queens.



### NUTRIENT CYCLE

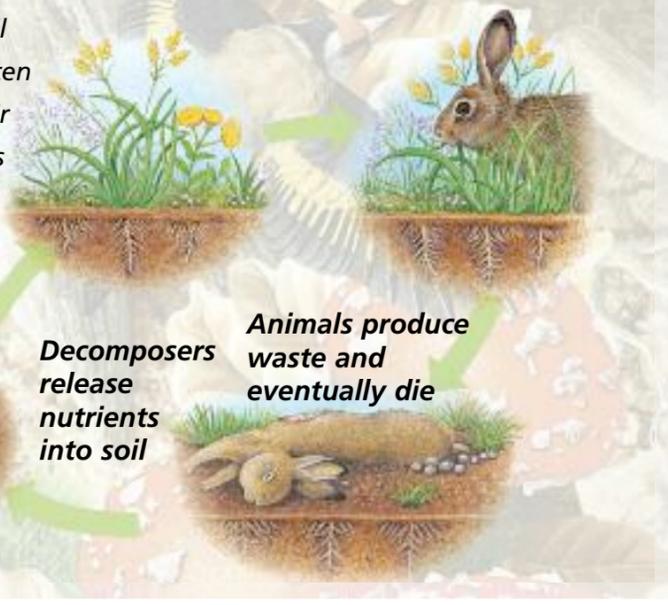
Nature never runs out of nutrients because they are all recycled. A dead rabbit is eaten by worms and maggots. Their droppings and rotting bodies enrich the soil so that plants can grow—and feed more rabbits.

Nutrients taken up by plants

Plants eaten by animals

Decomposers release nutrients into soil

Animals produce waste and eventually die



## ZEBRAS

*Zebras gather together in their hundreds on the savannah. Large herds help protect them: many eyes and ears can more easily detect approaching predators.*

## ELEPHANTS

*The African elephant's trunk, powerful enough to uproot a tree, is used to suck up water and grasp food to place in its mouth. It feeds on grass, leaves, bark, twigs and fruit.*

## AFRICAN BUFFALOES

*A formidable fighter, only a young or sick buffalo would normally fall prey to a lion or crocodile. African buffaloes must live close to water. They drink regularly and often wallow in mud.*

*Fish eagle*

*Lion  
(stalking  
buffalo)*

*Zebras*

*Giraffes*

*African buffaloes*

*African elephants*

*Kingfisher*

*Goliath heron*

## FISHING BIRDS

*Kingfishers are small birds with jewel-like colours. They sit on branches over stretches of water, diving in to catch small fish in their beaks. They then swallow them whole. Herons are wading birds, standing in the shallows and snapping up fish in their long beaks.*

*Black crane*

## Savannah

**T**he grasslands of Africa are known as the savannah. Here, the climate is hot, with a dry season followed by a rainy season. The grassy landscape is scattered with bushes and trees. The vast expanses of grass are food for a wide range of grazing animals. Most live in herds to give protection from predators. When the dry season begins, they migrate to areas where grass and water can be found.

### BROWSERS...

Savannah herbivores that feed on leaves are called browsers. Giraffes use their long black tongues to strip leaves from the highest branches. The elephant uses its trunk to do the same lower down. The gerenuk reaches high by standing up on its hind legs. The tiny dik dik selects only the juiciest of leaves from the lower branches of trees and bushes. The black rhinoceros has a flexible top lip that it uses to grasp leaves, or even strip the bark off trees.



Giraffe

Elephant

Gerenuk

Rhinoceros

Dik dik

### ...AND GRAZERS

Zebras crop the tough tops of the savannah grass, while wildebeest tear out the leafy middles. This makes room for Thomson's gazelles to reach the juicy plants underneath.



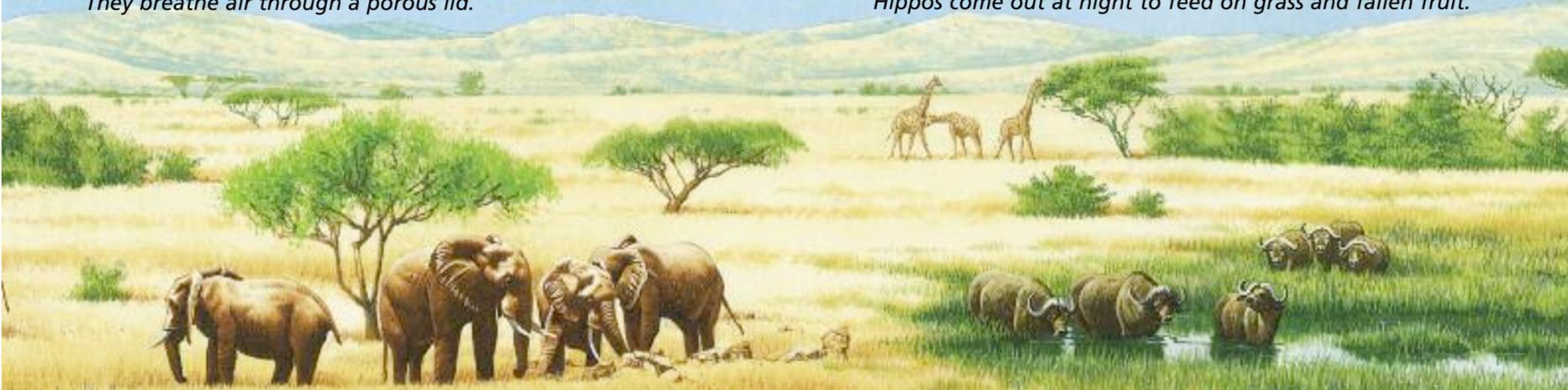
Wildebeest

Zebra

Gazelle

### LUNGFISH

If their ponds dry up, lungfish survive by burrowing into and sealing themselves inside the mud. This prevents them from drying out. They breathe air through a porous lid.

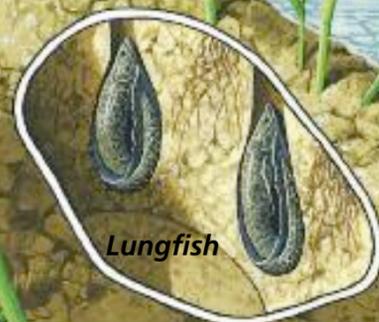


Sitatunga

Hippopotamus

Crocodile

Catfish



Lungfish

### HIPPOPOTAMUS

Hippos spend their days resting in the swampy water. They stir up the bottom mud, providing nutrients for other swamp life—which become prey for wading birds. Hippos come out at night to feed on grass and fallen fruit.

### CROCODILES

Crocodiles are fierce reptiles with long, scaly bodies. They live close to rivers, lakes and estuaries in tropical regions. The largest species such as the Nile crocodile (below) can grow to more than seven metres long and can kill large prey, such as cattle. They lie in the water, waiting for their prey to come to the water and drink. Then they lunge out, dragging their prey in to the water to drown.

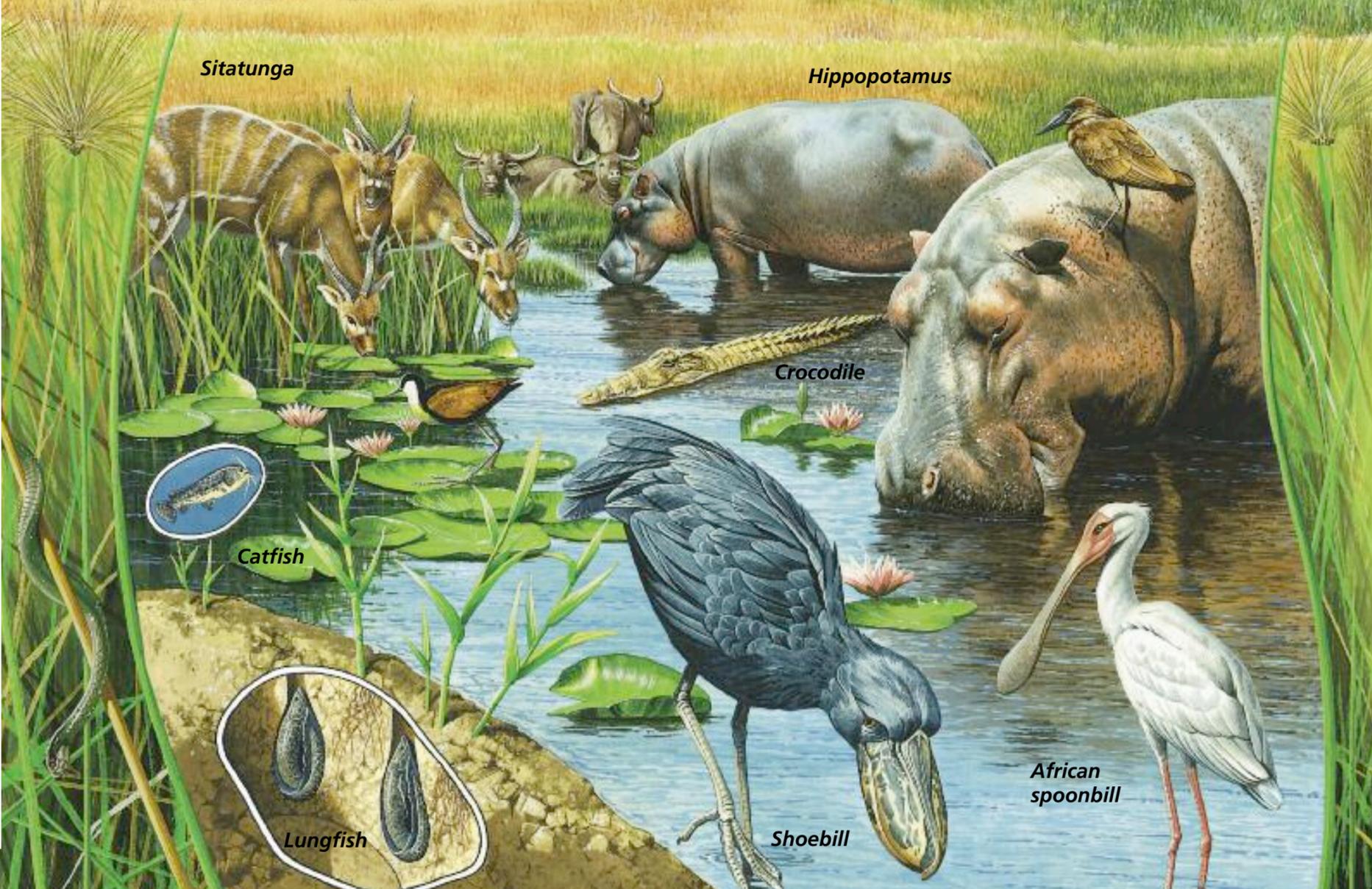


### Papyrus swamp

Amid the savannah plains of southern Africa lie the swamplands of the

Okavango Delta. The annual flooding draws a huge variety of thirsty animals to the region. Some animals live on the edges of the swamps all year round.

The plant life is dominated by papyrus, the paper reed, which can grow to heights of 2.5 metres or more.



African spoonbill

Shoebill

## DESERT HUNTERS

Bobcats, coyotes and kit foxes prey on small mammals such as rabbits and ground-dwelling birds. Small mammals are also at risk from the Gila monster. This large lizard has a stout tail where it stores fat for use when food is hard to find. It is the only venomous lizard. The tarantula spider also uses venom to kill its victim. It lies in wait before pouncing on an unsuspecting lizard or other small animal.

## WOODPECKER

The Gila woodpecker hollows out its nest in the Saguaro cactus. The cactus spines help to protect the nest from enemies.

## SAGUARO CACTUS

The giant Saguaro cactus grows more than 15 metres tall. It collects any rainwater that falls in this arid region and stores it in its thick stem and branches. About 90% of its

weight is made up of water. The surface of the cactus is coated in a waxy layer which helps prevent loss of water through evaporation. Its covering of spines deters animals from eating it.

## Desert

Much of southwestern USA and northern Mexico are covered by stony desert.

During the day, temperatures may soar to more than 50°C. Despite the harsh conditions many animals can survive here. Plants store the meagre rainfall in their stems. Insects feed on the plants and are themselves food for birds, lizards and scorpions. Many desert animals get the water they need from their food.



Bobcat

Gila woodpecker

Hummingbirds

Saguaro cacti

Coyote

Pronghorn

Ants

Gila monster

Jack rabbit

Chuckwalla

Flycatcher

Monarch butterfly

Cactus wren

Prickly pear

Roadrunner

## ROADRUNNER

Although capable of flight, the roadrunner rarely flies. With its powerful legs, it can run at 25 km/h or more. It feeds on insects, lizards and small snakes, which it grabs in its sharp beak.

Collared lizard

Tarantula

Swallowtail

Scorpion

## DESERT SURVIVAL

Desert creatures have adapted in various ways to survive in such a dry environment. The dromedary camel (below) can go without water for months. Its hump stores fat that is used as an emergency food store. It can also be broken down to form extra water. When the dromedary camel does find water, it can drink over 100 litres at one time!



## KEEPING OUT SAND

The dromedary camel has wide feet to stop it sinking into the soft sand. It also has double rows of long eyelashes to prevent sand getting into its eyes, and slit-like nostrils it can close to keep sand out if its nose.



## NESTERS

The swollen stems of the Saguaro cactus make perfect homes for the tiny elf owl—which uses hollows made by Gila woodpeckers to make its own nest.



Elf owl

Gila woodpecker



## WARMING UP

Reptiles need to warm up in the sun before they can become active enough to hunt, so they cannot feed at night. Instead, they shelter

in burrows or rock crevices during the hottest part of the day, basking and feeding during the cooler early morning and evening.

# Desert survival

Most desert animals are inactive during the scorching heat of the day.

Many, such as the kit fox, pocket mouse and cacomistle (a relative of the raccoon) spend this time in cool burrows or under rocks.

The animals emerge from their burrows as the sun sets. The kit fox uses its speed and keen sense of hearing to run down kangaroo rats, lizards and rabbits.



Gila monster

Western diamondback rattlesnake

Cacomistle

Trapdoor spider

Pocket mouse

Kangaroo rats

Kit fox

Bull snake



## SANDGROUSE

The sandgrouse is a sandy-coloured bird that lives in the deserts of Africa and Asia. The male flies up to 25 kilometres every day just to find a waterhole. Here, he soaks his breast feathers in water. Then he flies back to his chicks and they drink the water from the feathers. Sandgrouse also protect their young by providing them with shade during the heat of the day and shelter during the cold desert nights.

## RATTLERS

The rattle at the end of a rattlesnake's tail is made of loose rings of hard skin. The snake shakes it to scare away other animals. The rattler kills its prey by biting them with its long, venomous fangs.

## IN THE CANOPY

The greatest variety of life is found in the canopy, the almost continuous "roof" of the forest where the leaves, branches and flowers receive most of both the rain and sunshine. Some plants, called epiphytes, grow in moss that has collected on the tree branches. They include orchids and bromeliads, whose leaves form vases to collect rainwater. Caterpillars feed on the leaves and are in turn eaten by frogs and birds.

Epiphyte flowers

## MONKEYS

Monkeys use the forest branches as high-level walkways through the trees. Agile spider monkeys and squirrel monkeys feed on the abundant fruits and nuts growing in the canopy. Troops of howler monkeys signal their presence to other troops with howls that can be heard several kilometres away.

Blue and yellow macaw

## MACAWS

Parrots and macaws use their extremely strong beaks to crack open

seeds and nuts. Their beaks, along with their claws, also help them to clamber among the twigs.

Squirrel monkeys

Spider monkeys

Scarlet macaw

Green iguana

Toucan

Howler monkeys

Emerald tree boa

Kinkajou

## NIGHT FEEDERS

The kinkajou emerges only at night to feed on fruit, insects and nectar. It uses its long, grasping tail as a fifth limb to enable it more easily to move through the trees. The emerald tree boa is another nocturnal animal. Coiled on a branch, it strikes out at small mammals, frogs, lizards and birds, snaring them in its fanged teeth.

Morpho butterflies

Three-toed sloth

Tree frog

# Tropical rainforest

The Amazon rainforest of South America is by far the largest of the world's tropical rainforests. The trees are dense and tall, so very little light reaches through to the forest floor. Many creatures, including birds, monkeys and sloths live only in the trees, rarely—if ever—descending to the ground. Others, such as the jaguar, peccary and tapir, roam the river banks at night.

### FLOOR DWELLERS

At night, shy tapirs come down to the water to drink. They use their short trunks to pull up plants on the forest floor. Along with the pig-like peccaries and capybaras, large aquatic rodents, they are wary of dangerous predators. The jaguar, a big cat, makes use of the dense forest cover to get as near as possible to its victims. The nine-metre-long anaconda, meanwhile, basks in shallow water waiting to strike.

Jaguar

Tapir

Peccaries

Anaconda

Jacana

Capybara

Umbrella bird

Cayman

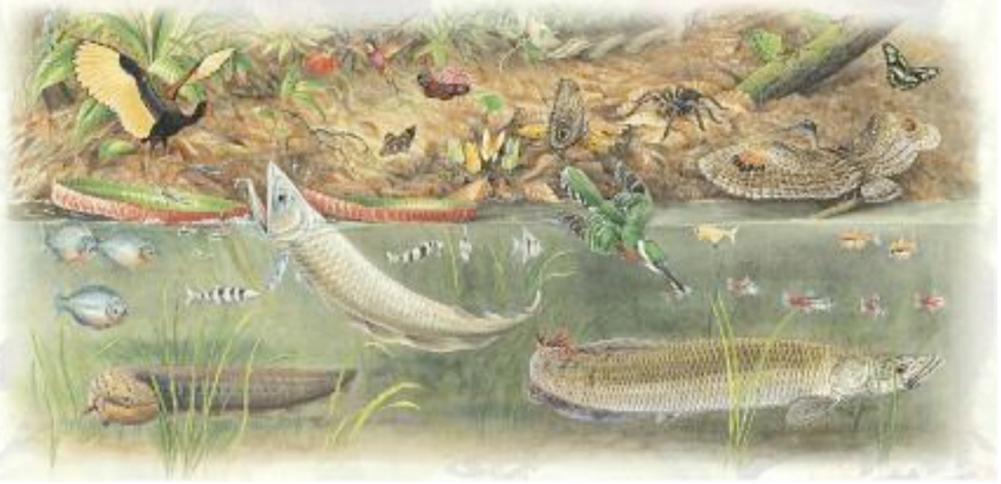
## Tropical river

Thousands of tributary rivers and streams flow through the rainforest to meet the great River Amazon. Most are teeming with fish. Many rainforest animals come to the streams to drink and to feed on the fish or water plants. Some, like the peccary, a relative of the pig, may fall prey to the dangerous cayman, anaconda or jaguar.

### AMAZON FISH

The largest of all Amazon fish, the pirarucu grows to four metres or more in length. The pirarucu and arawana both prey on insects and other fish. They will often leap right out of the water to take them. The pirarucu has even been known to

snatch birds off branches! The piranha is armed with razor-sharp teeth. Schools of piranhas will, on detecting blood in the water, set about an injured animal, reducing anything it to a mere skeleton in a very short time. But normally the piranha feeds on small fish and fruit.



### FOREST LEVELS

Life in the rainforest is organized into several layers. The highest trees are those that grow taller than the other trees around them. These are known as emergent trees. Beneath the emergent layer is the canopy, a "roof" made up of tree foliage. Lower down is the shady understory. Little daylight gets through to the forest floor.

### CAYMAN

The cayman has its eye on an unsuspecting tapir or capybara. It will suddenly pounce, seizing the prey in its teeth before dragging it back under water to drown.

## LEAPERS AND DIVERS

Dolphins live together in groups, called pods. They move their flukes (tails) up and down to drive themselves through the water. They often leap out of the water when swimming at speed. Air offers less resistance than water, so the dolphins can save energy. As mammals, they also need to breathe air as they go.

To catch fish, brown boobies may dive into the water to grab them in their beaks. But they also specialize in picking off flying fish as they skim across the surface of the waves.

**Common dolphin**

**Brown booby (diving for fish)**

**Portuguese man-o'-war**

**Brown booby**

**Flying fish**

**Common dolphin**

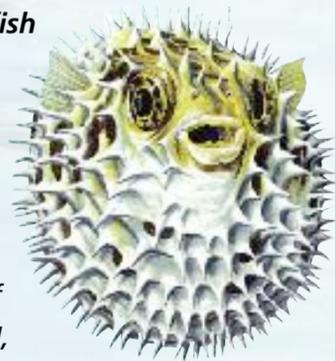
## FLYING FISH

To escape undersea predators, flying fish can glide for distances of up to 100 metres above the waves using their "wings"—actually long, taut fins. But they then become vulnerable to birds.

## The oceans

The richest variety of life in the oceans is found in the surface waters. Here, light from the sun penetrates the water, allowing plants to grow. The tiny oceanic plants, called phytoplankton, that drift through the water provide food for many tiny animals (zooplankton), which in turn are eaten by fish. Below the surface, small fish are preyed upon by larger, fast-moving predatory fish, such as tuna or sharks.

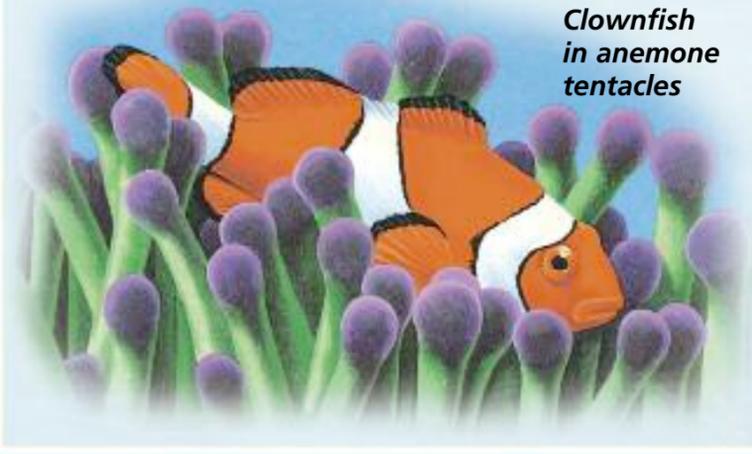
**Porcupinefish**



**DEFENCES**

Porcupinefish have three lines of defence. Normally they are small, but when threatened, they swallow water to swell their body to more than double its usual size. This puffs out sharp spines all over their body. The porcupinefish is also deadly poisonous if eaten!  
Clownfish (below) live on coral reefs among anemones. Their poisonous tentacles protect the clown fish from predators, but the clownfish is immune to their stings.

**Clownfish in anemone tentacles**



**UNDERWATER JUNGLE**

Coral reefs are crowded with fish: it is estimated that about one-third of all fish species live in waters close to reefs. Many feed on the plentiful algae (microscopic plants) that live inside the coral itself or drift in the current. Other reef-dwellers, such as sharks, stingrays, sea snakes and moray eels, prey on them. Parrotfish feed on the coral itself. Their vibrant colours enable them to mark out territories and scare off their enemies. The clown triggerfish also has very distinctive markings. The spine on its back can be locked in an erect position. This helps wedge the fish inside a crevice when it is sheltering from predators.

**PORTUGUESE MAN-O'-WAR**

The Portuguese man-o'-war is not a single animal but a colony of polyps, each with its own job. Stinging tentacle polyps catch food, feeding polyps digest it and one large inflated polyp keeps the colony afloat.

**Coral reef**

Coral forms from the hard skeletons of tiny animals called polyps. They live together in huge colonies in shallow, sunlit waters along tropical coasts and volcanic islands. Over hundreds of years, great underwater banks, called coral reefs, may build up. Different kinds of polyps produce the many different shapes and colours of coral. Coral reefs provide perfect hiding places and a rich source of food for an enormous number of marine species.



**POLYPS AND SLUGS**

A coral polyp is a tiny animal, just a few millimetres across. It is little more than a stomach with a ring of food-catching tentacles around its mouth. It creates a hard, hollow skeleton at its base to live on.



A sea slug's bright colours warn that it is poisonous. But its poison is not its own. It feeds on sea anemones and stores their stinging cells to use against its own predators.

**Sea slug**

**Male southern elephant seals fight for supremacy of the colony**

## GLIDERS AND PIRATES

Using its outstretched, motionless wings, the wandering albatross glides and soars for hours. At 3.5 metres, its wingspan is the largest of any bird. The great skua preys on the eggs and chicks of Adélie penguins and petrels. It will also attack other sea birds in mid-flight to steal their prey.



**Emperor penguins**



**Storm petrels**



**Wandering albatross**



**Great skua**



**Storm petrel**



**Great skua attacks penguin chick**



**Chinstrap penguins**

## PENGUINS

Penguins are sea birds that live only in the Southern Hemisphere. The emperor, Adélie and chinstrap penguins live in Antarctic waters. On the ice, they waddle around clumsily, or toboggan on their bellies. In the water, they are graceful swimmers, using their wings as flippers to propel themselves through the water.

The largest kind is the emperor penguin. After mating, the male incubates the egg on his feet for two months, where it keeps warm under a flap of skin and feathers. Adélies are the commonest Antarctic penguins. Chinstraps are so-called because of their facial markings. Both Adélies and chinstraps feed on shrimps and small fish.

**Adélie penguins**



**Humpback whale**



**Killer whales**



**Wandering albatross**



# Antarctica

Lying at the southern end of the Earth, Antarctica is the coldest continent. While almost nothing lives in the bleak, ice-covered interior, its coastal waters teem with life. In summer, the sea is thick with microscopic plants called phytoplankton. These are eaten by tiny animals, including krill, a shrimp-like crustacean, which is itself a staple food for many other animals. Fish, birds, seals and whales all take advantage of the abundant food supply.

## GROWING UP



King penguins live in colonies on the islands near Antarctica. They lay their eggs in the summer. The father balances the egg on his feet, so it does not touch the cold ground (left). It is covered by a warm feathery flap between his legs. About two months later, the chick hatches. It is covered in soft black down and is still carried on its parent's feet to keep it off the ground (right).

By the time the chick is two months old, it has grown a thick covering of short brown feathers (bottom). It is left with the other chicks in the colony while its parents go hunting.



When the chick is 10 months old, its adult feathers start to grow (left). It has built up a layer of blubber to keep it warm and relies less and less on its parents to feed it.



## POLAR HUNTERS

Just beneath the water's surface, the hunters of Antarctica lie in wait. The leopard seal patrols the coastal waters where it preys on Adélie penguins, fish and even other seals. Killer whales, up to 10 metres long, are also fearsome predators. Fast and streamlined, they hunt seals and penguins.

**Adélie penguins**

**Leopard seal**

**Killer whale**

**Adélie penguins**

**Crabeater seals**

## CRABEATER SEAL

Despite its name, the crabeater seal does not actually eat crabs. Instead it eats tiny shrimp-like krill—the only seal to do so. The seal swims with its mouth wide open. The water drains through its teeth, leaving behind the krill.

## Polar waters

Only warm-blooded birds and mammals are able to live in the Earth's coldest regions, the Arctic and Antarctic icecaps. Polar animals are specially adapted to survive cold, icy conditions and winds of up to 200 km/h. They have thick fur or feathers, and many also have a layer of fat, called blubber, just beneath their skin to keep them warm. Some polar land mammals have white fur to camouflage them in the ice and snow.

## KRILL

Krill is a tiny, shrimp-like creature that forms a large part of the diet of many ocean animals, including the great whales. Vast quantities of krill gather in polar waters during the summer months. Many whale species migrate to the Arctic or Antarctica to feed on them.



## ARCTIC PREDATOR

Polar bears spend most of the year on floating ice in the Arctic, where they hunt seals. They use their excellent sense of smell to sniff out breathing holes in the ice, where they wait for a seal to appear.



# Glossary

**Algae** Plants without true stems, roots and leaves, found in water or moist ground. They include microscopic plants called plankton.

**Bacteria** Tiny living things made up of only one cell, the "building" block of all living things. Bacteria play a vital role in recycling nutrients in the soil.

**Biome** A large group of habitats that are similar to one another.

**Canopy** The mass of branches and leaves in the upper part of trees. Where trees grow closely together the canopy forms an almost continuous "roof".

**Community** Animals and plants that live together and rely on each for survival.

**Crustacean** A group of animals with hard external skeletons that includes crabs, lobsters, shrimp and barnacles.

**Epiphyte** A plant that grows on another plant and has no roots in the soil.

**Food web** The pattern of what animals feed on in a certain place.

**Habitat** The type of surroundings in which an animal or plant lives.

**Hibernation** The process by which some animals spend winter in a state of reduced physical activity. Breathing and other body systems slow down, conserving energy.

**Larva** The immature form of some animals, such as insects.

**Migration** The movement of animals from one place to another at a certain time of the year, to feed or breed.

**Nutrients** Substances needed to maintain a living thing's activity and growth.

**Plankton** Microscopic plants that float or swim in lakes or oceans.

**Predator** An animal that hunts and kills other animals for food.

**Savannah** Tropical grasslands with scattered bushes and trees.

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