



CHILDREN'S

NATURE

ENCYCLOPEDIA

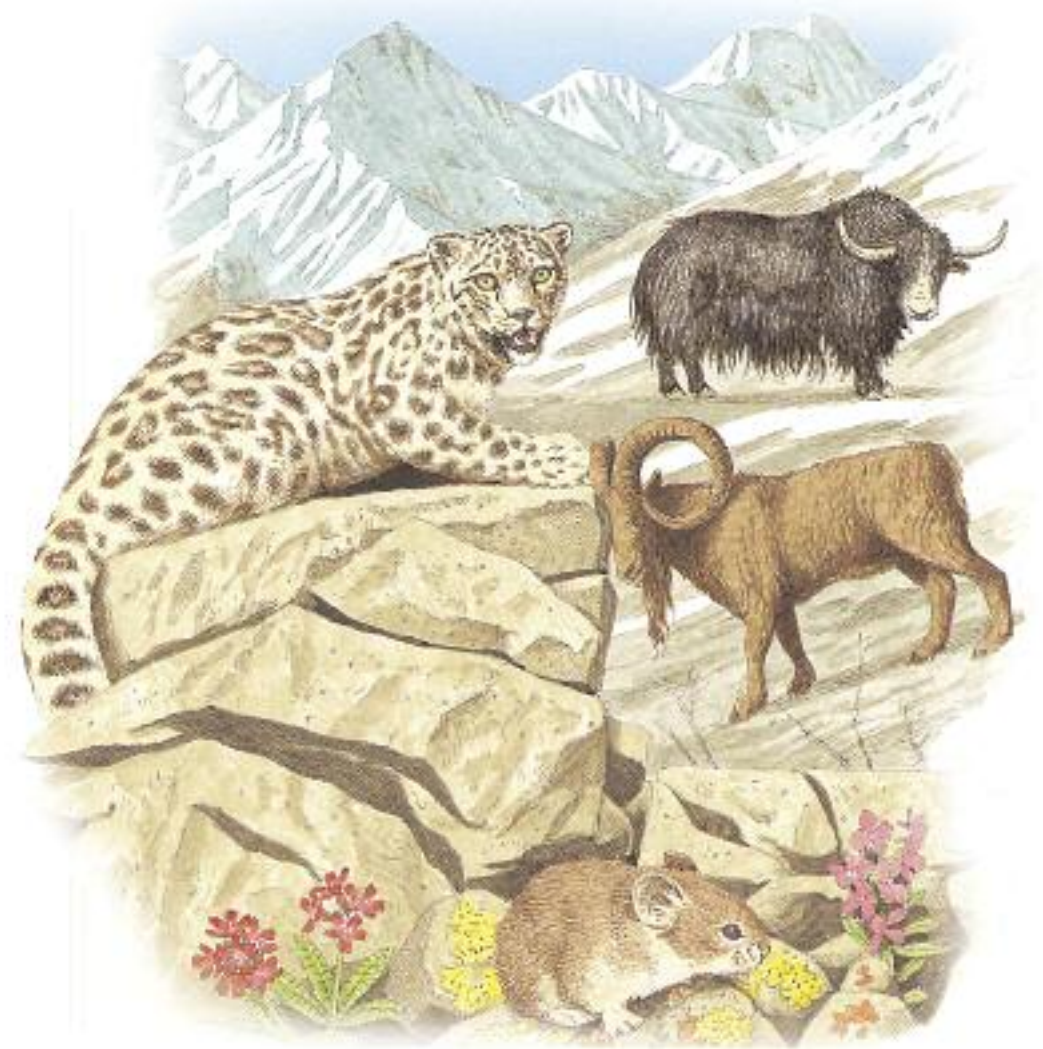


Environments • Oceans • Cycles

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Created and produced by Nicholas Harris,
Sarah Hartley, Katie Sexton, Ruth Symons
and Erica Williams, Orpheus Books Ltd
www.orpheusbooks.com

Illustrators Susanna Addario, Ferruccio Cucchiari,
Fiammetta Dogi, Elisabetta Ferrero, Giuliano Fornari,
Gary Hincks, Ian Jackson, Alessandro Rabatti,
Claudia Saraceni, Ivan Stalio and Thomas Trojer

Consultant Steve Parker

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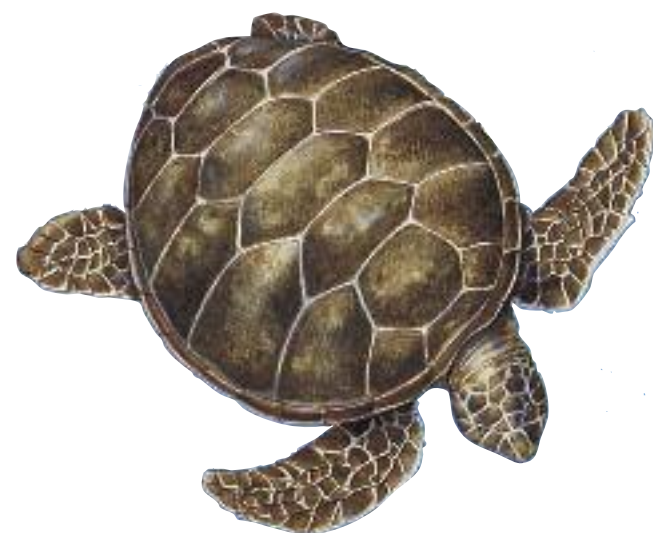
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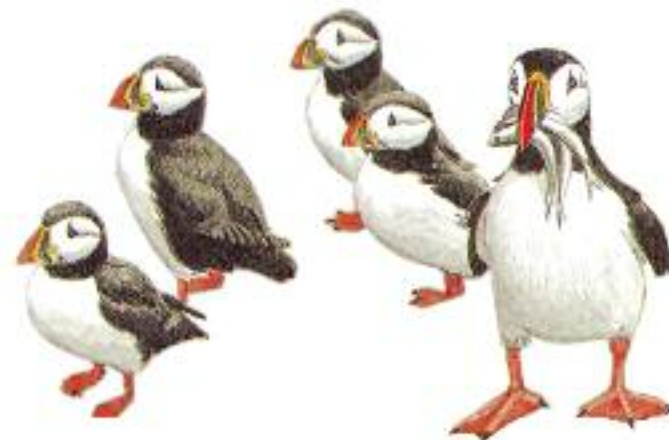
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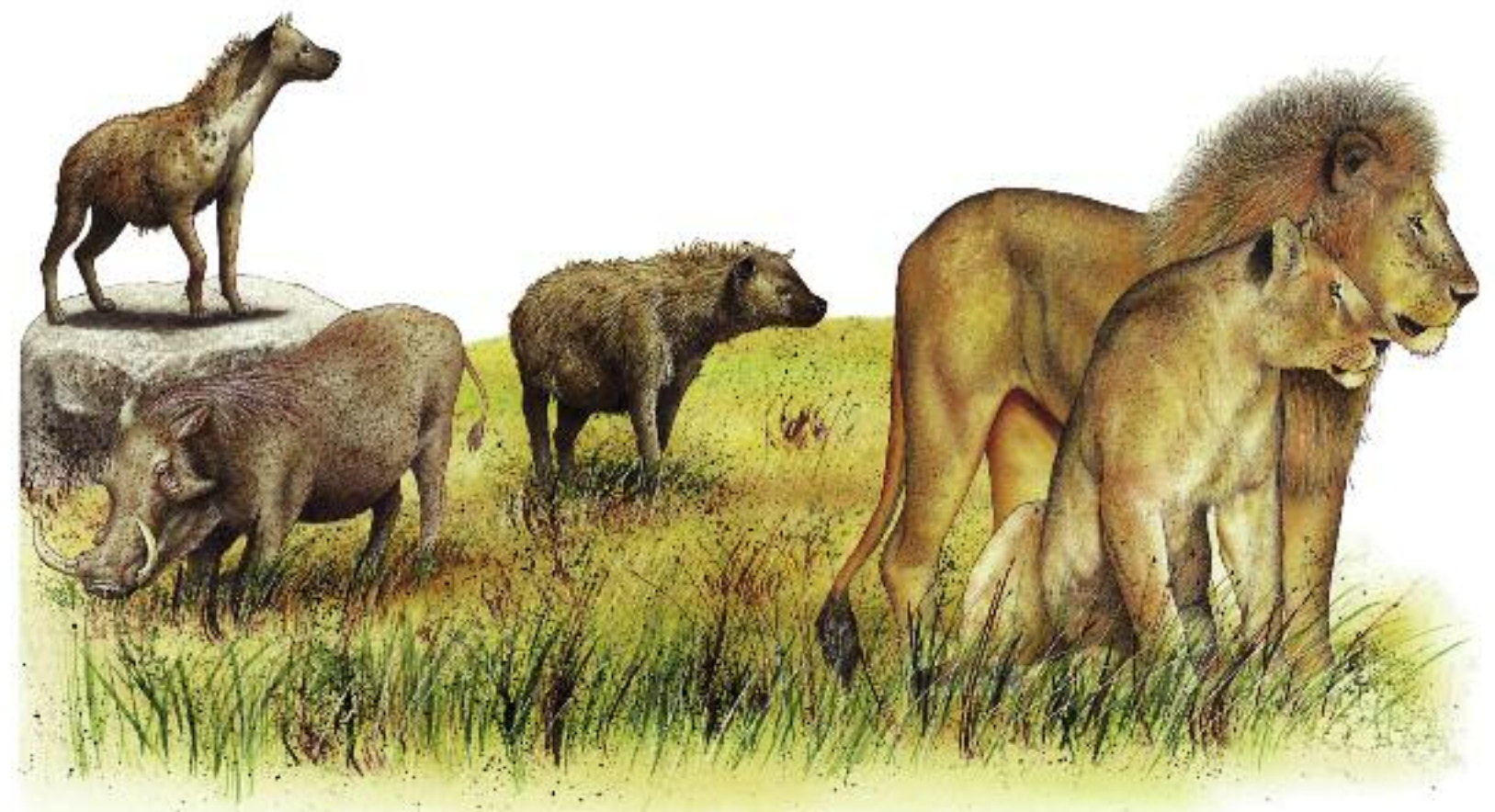
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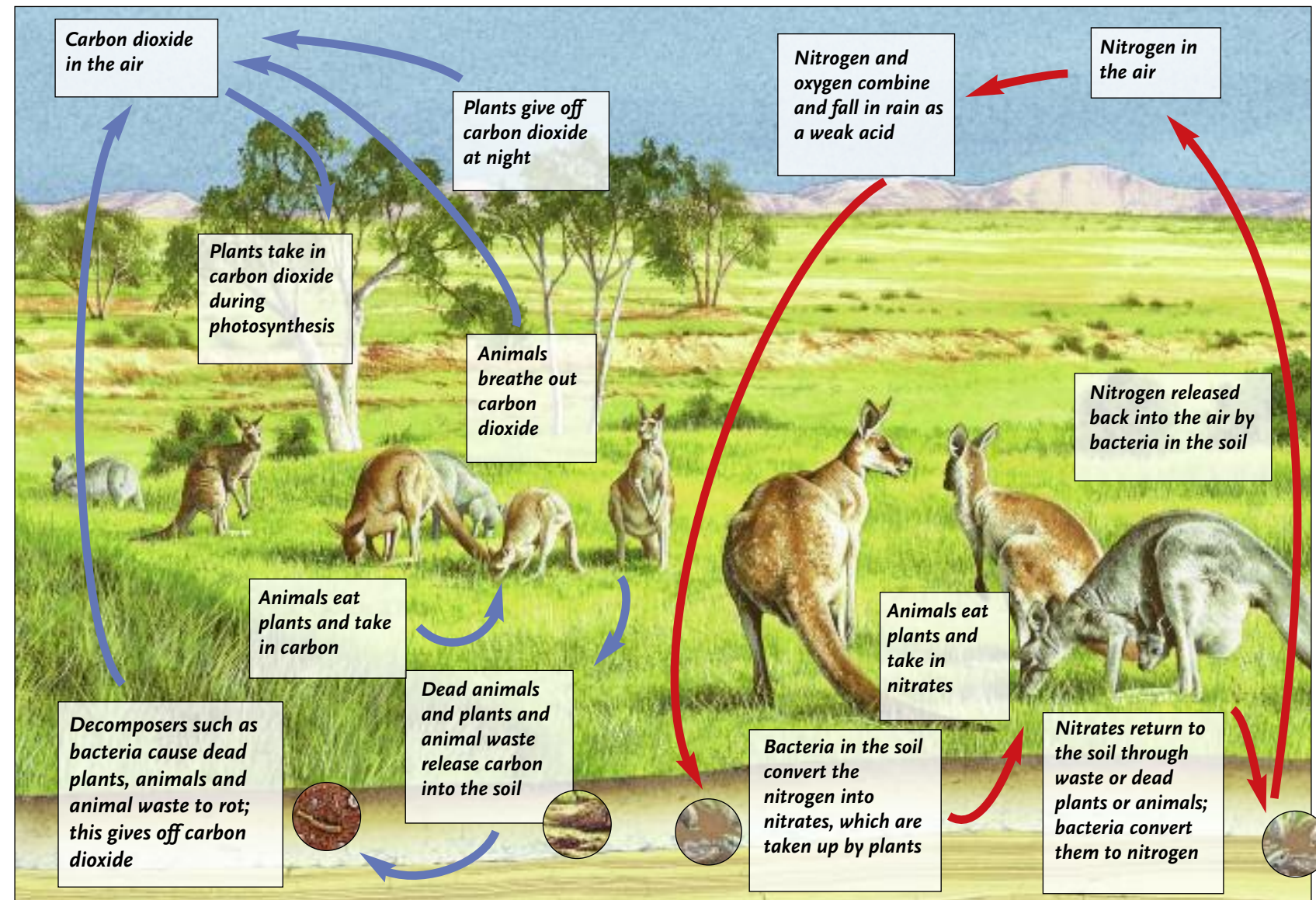
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CYCLES IN NATURE

IN NATURE, chemical elements vital to life, such as oxygen, carbon and nitrogen, are neither made nor destroyed. They are recycled, moving round and round in the natural world in the form of minerals and nutrients. On land, they move from the soil into plants, then into animals that eat plants, and then sometimes into other animals that eat plant-eating animals. Minerals and nutrients return to the soil either through an animal's droppings, or whenever any plant or animal dies and rots away. Micro-organisms in the soil, such as bacteria, play an important part in releasing the nutrients and minerals from the decaying matter.

6



Nutrients are always recycled. They are taken up by plants, which are then eaten by animals. Animals produce waste and eventually die. Through their droppings and their rotting bodies nutrients return to the soil, where they are taken up by plants. And so the cycle continues.

Plants take up nutrients from soil

Animals eat plants

Animal produces waste and eventually die

Decomposers, such as worms and bacteria, return nutrients to the soil

▲ Carbon, in the form of carbon dioxide gas, is taken in by plants during photosynthesis. Animals eat the plants and use the carbon to make and build up their own body parts, and to gain energy. They release carbon dioxide back into the air when they breathe out. Meanwhile, through their droppings, or their carcasses when they die, carbon is released into the soil. From here, it is given off back into the air. This is called the carbon cycle.

▲ Nitrogen occurs in the air as a gas. It gets into the soil through rain. Bacteria in the soil change nitrogen into nitrates, nutrients that are needed by all living things. Plant roots take up nitrates, which are then passed on to animals as they eat the plants. When living things drop waste or die, nitrates return to the soil. Other kinds of bacteria, called denitrifying bacteria, take in the nitrates and release nitrogen gas back into the air. This is called the nitrogen cycle.

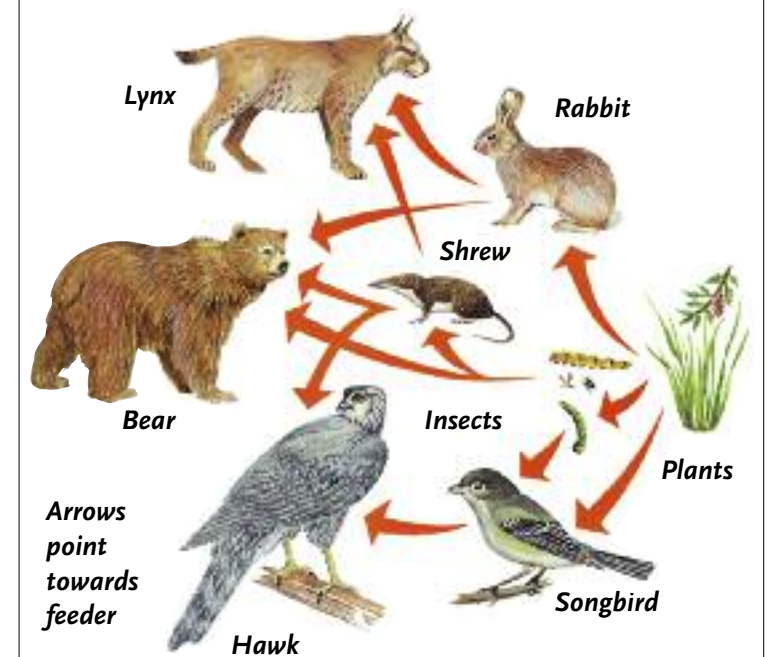
This scene of kangaroos grazing in the grasslands of Australia shows the carbon cycle (blue) and nitrogen cycle (red) at work.



FOOD WEBS

LIVING THINGS depend on each other for survival. Plants provide food for plant-eating animals (herbivores), which may become prey for meat-eating animals (carnivores). These may, in turn, be eaten by larger carnivores. This is called a food chain. Since animals often eat more than one kind of food, many food chains are linked together to form a food web.

In a North American forest, plant-eating animals such as rabbits are prey for lynx or bears. Shrews are insect eaters and they are hunted by these same predators. Bears also feed directly on plants and insects.



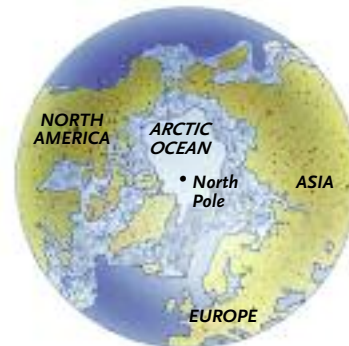
◀ Different animals and plants that depend on each other for survival form what is known as a community. Their natural homes are all different kinds of habitat, environments that have similar natural features, such as forests, deserts or grasslands. These creatures form part of the soil community in a broadleaf woodland habitat.

7

POLAR LANDS

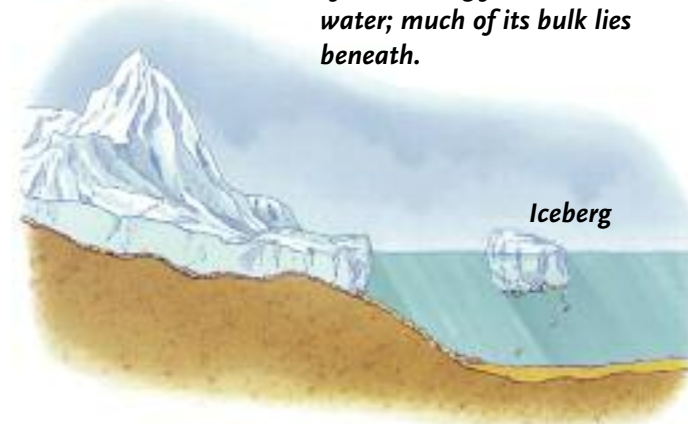
THE NORTH POLE is surrounded by the permanently icy Arctic Ocean. At the opposite end of the Earth, the South Pole is on the continent of Antarctica. Because the Poles never come as close to the Sun as the rest of the Earth, they do not get as much warmth. This means that ice and snow cover the Poles all year round.

To survive in the cold, many polar animals have thick fur or layers of fat on their bodies. The only humans living on harsh Antarctica are scientists studying the environment. In contrast, different groups of people, such as the Inuit of Greenland and northern Canada, have lived in the Arctic region for thousands of years. They hunt polar animals for food and clothing.



◀ Polar lands are found at the most northerly and southerly points of the Earth. In the north, much of the Arctic Ocean is permanently covered with a mass of slowly moving ice, called pack ice. The southern continent of Antarctica is covered in a thick layer of ice called an ice cap.

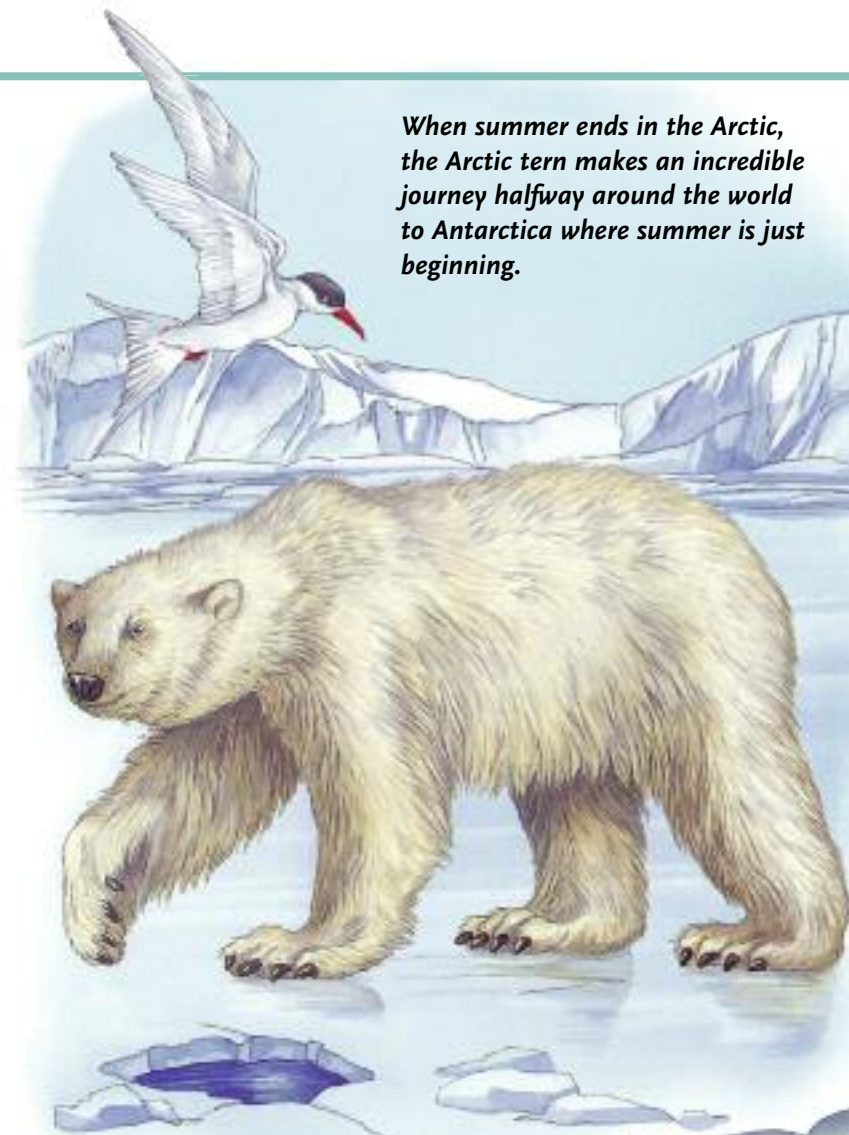
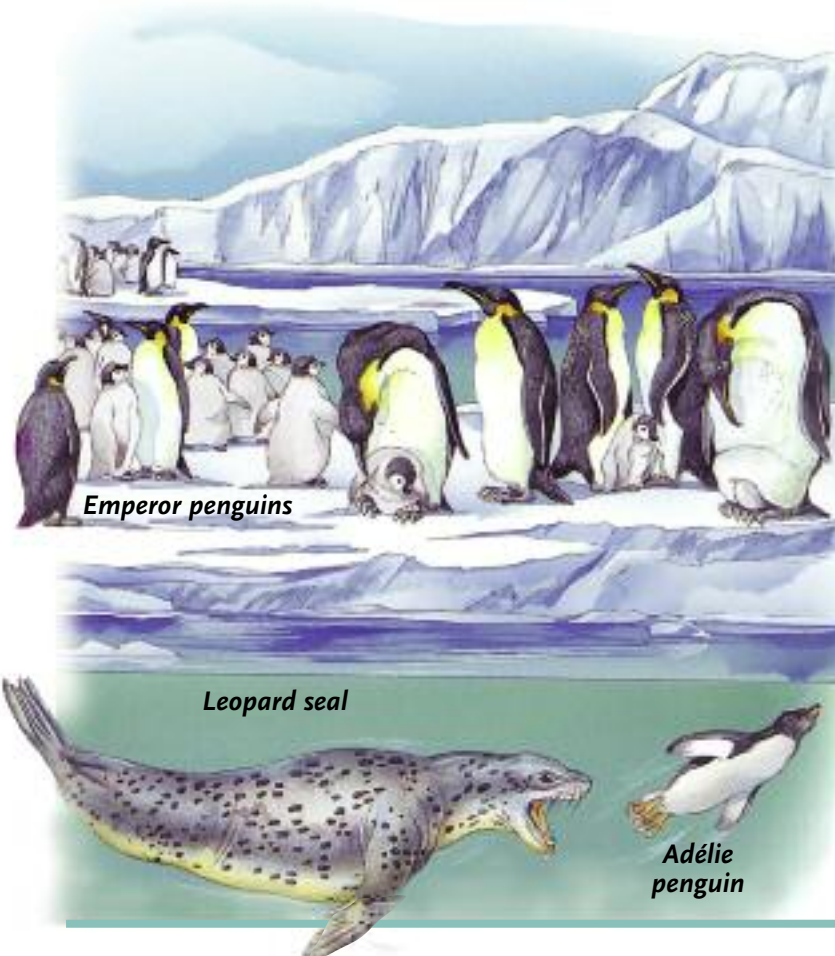
Icebergs are large chunks of ice that fall into the sea from glaciers or parts of an ice cap. A small part of the iceberg floats above the water; much of its bulk lies beneath.



◀ Antarctica is the coldest place on Earth. It has ice about two kilometres thick, high mountains and fierce blizzards. Only a very few plants and animals live on the land, although the cold waters off the coast are full of life, including fish, birds, seals and whales. Emperor penguins lay their eggs on the ice. Then the males carry the eggs, and even the newborn chicks, between their own feet and belly for warmth. The smaller Adélie penguin is the favourite meal of the ferocious leopard seal.



Walrus eat shellfish from the sea bed, which they find using their sensitive whiskers.

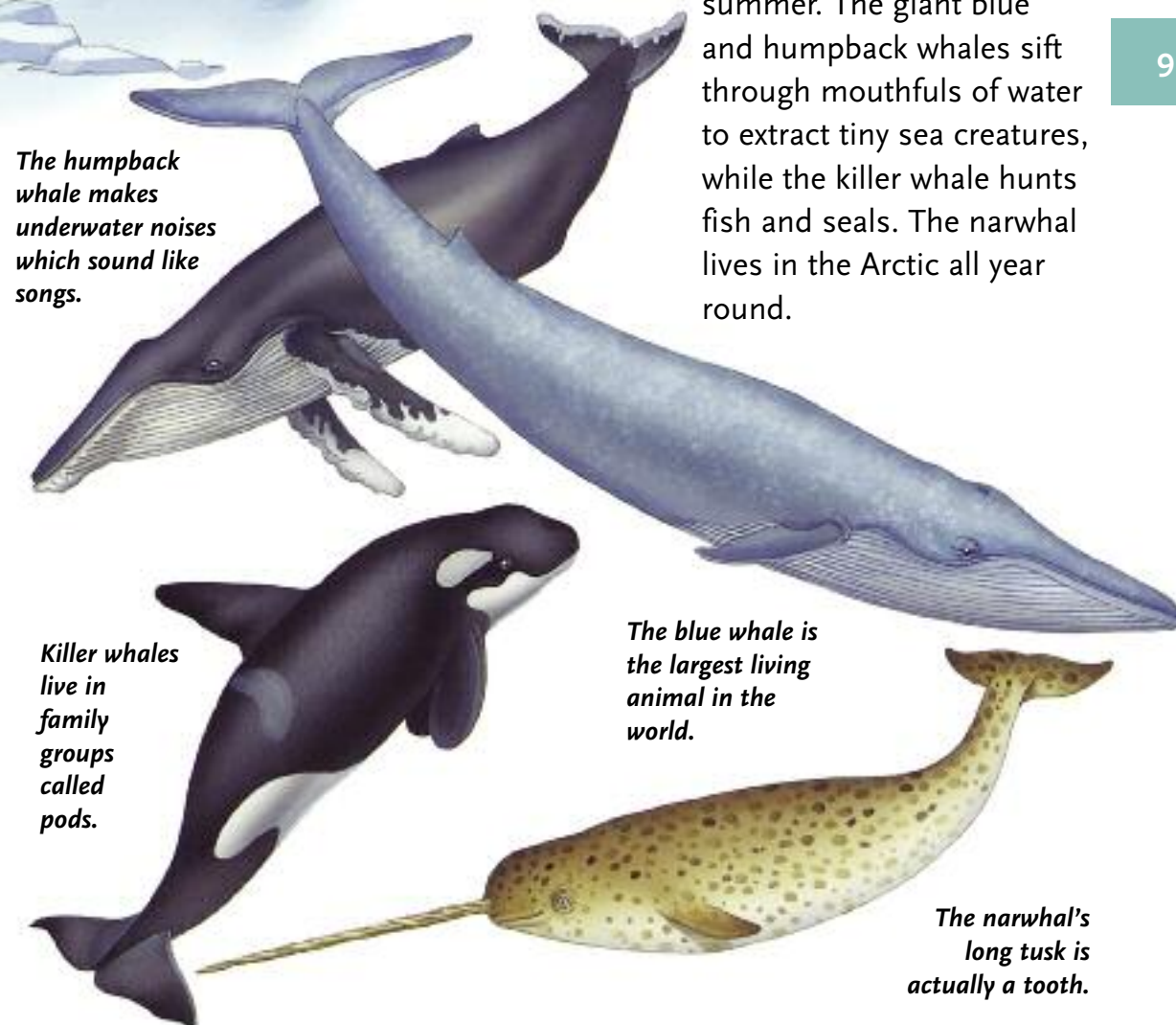


When summer ends in the Arctic, the Arctic tern makes an incredible journey halfway around the world to Antarctica where summer is just beginning.

▲ The animals that live in the Arctic region take their food from the sea. Tiny plants and animals called plankton provide food for fish, which are then eaten by seals. They, in turn, are prey for the mighty polar bear. Polar bears lie in wait to catch seals as they come up through holes in the ice to breathe. The bear's thick white coat keeps it warm even while it is swimming in the icy waters.

Walrus (left) use their tusks both for fighting and defence. On warm days, large groups bask together in the sun and their skins turn pink.

The humpback whale makes underwater noises which sound like songs.



Killer whales live in family groups called pods.

The blue whale is the largest living animal in the world.

The narwhal's long tusk is actually a tooth.

▼ Many kinds of whale visit polar waters in the summer. The giant blue and humpback whales sift through mouthfuls of water to extract tiny sea creatures, while the killer whale hunts fish and seals. The narwhal lives in the Arctic all year round.



THE LANDS bordering the Arctic Ocean are bleak and treeless, with a permanent layer of ice lying beneath the soil. This is the tundra. During the short summer, small plants and mosses grow. Herds of reindeer or caribou come from the forests further south to feed on them. Musk oxen stay in the tundra all year round. If attacked by wolves, they form a circle around their young.

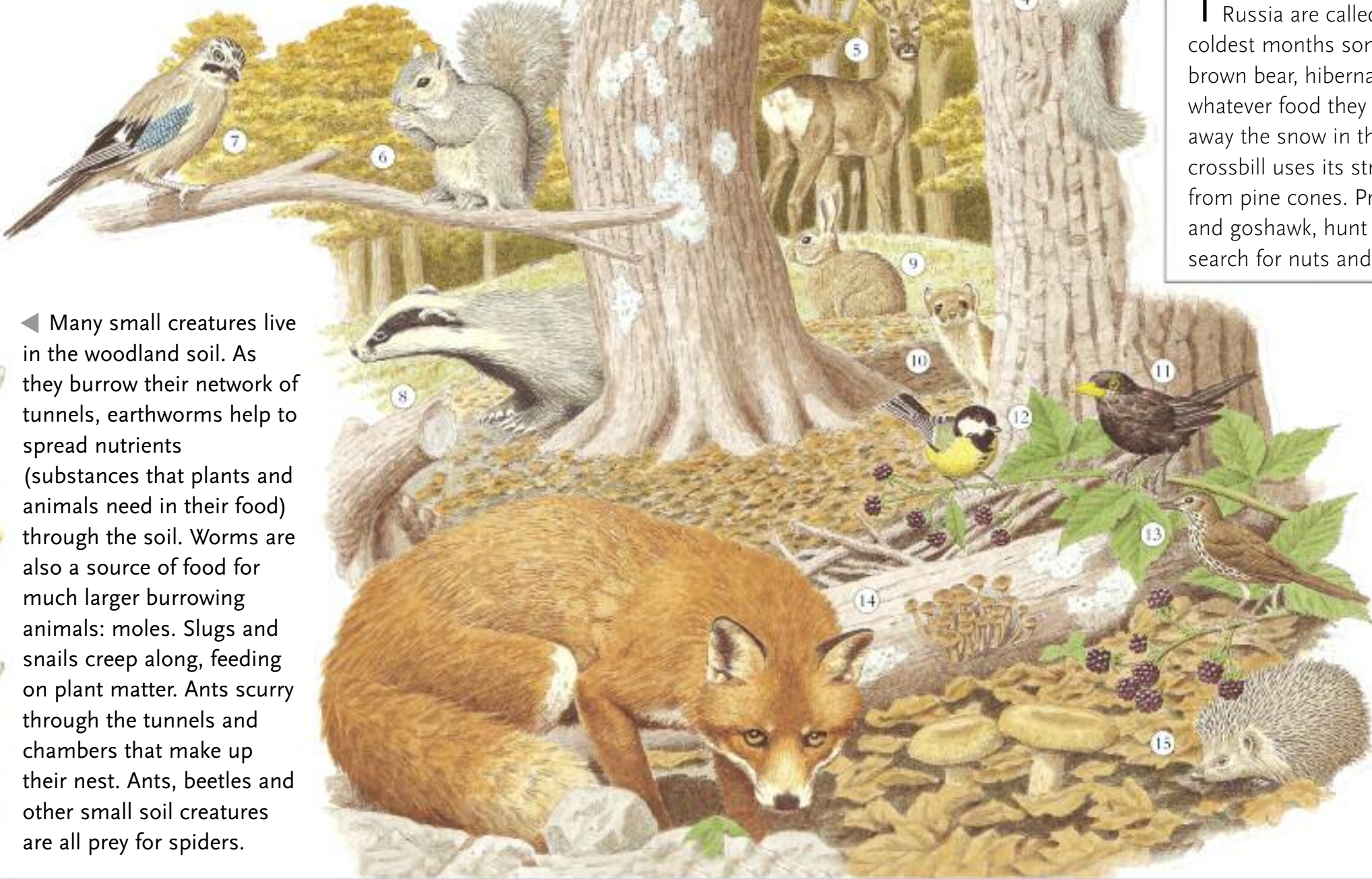
WOODLANDS

MANY parts of the world with a temperate climate are covered by woodlands—or would be if they had not been cleared for farmland or cities. Coniferous trees can survive in lower temperatures than deciduous trees, so coniferous woodlands are often found undisturbed in northerly or mountainous regions where few people live.

The trees and plants that grow in woodlands provide food and shelter for many different kinds of animal. Many of these animals are nocturnal: they come out only at night to feed on woodland plants, or to hunt other animals.



Large areas of coniferous woodland are found in North America, Scandinavia and Russia. They are called boreal forests (*shown as bright green*). Deciduous woodland (*shown as darker green*) still covers parts of eastern North America, central and western Europe, China and, in the southern hemisphere, the uplands of Australia and New Zealand.



- KEY
- 1 Red squirrel
 - 2 Green woodpecker
 - 3 Tawny owl
 - 4 Dormouse
 - 5 Roe deer
 - 6 Grey squirrel
 - 7 Jay
 - 8 Badger
 - 9 Rabbit
 - 10 Stoat
 - 11 Blackbird
 - 12 Great tit
 - 13 Song thrush
 - 14 Fox
 - 15 Hedgehog



THE VAST coniferous forests of northern Russia are called the taiga. During the coldest months some animals, such as the brown bear, hibernate, while others try to find whatever food they can. Elk and reindeer scrape away the snow in their search for mosses. The crossbill uses its strange beak to extract seeds from pine cones. Predators, such as the lynx and goshawk, hunt small mammals as they search for nuts and berries.

Many small creatures live in the woodland soil. As they burrow their network of tunnels, earthworms help to spread nutrients (substances that plants and animals need in their food) through the soil. Worms are also a source of food for much larger burrowing animals: moles. Slugs and snails creep along, feeding on plant matter. Ants scurry through the tunnels and chambers that make up their nest. Ants, beetles and other small soil creatures are all prey for spiders.

Autumn has begun in this wood in Europe. The fallen leaves start to rot and, with the help of the tiny creatures that feed on them, form a rich upper layer to the soil. Toadstools grow well in the moist ground. Squirrels and jays hide stores of nuts which will last them through the winter. Dormice prepare to hibernate during the cold months to come. Small mammals such as voles and rabbits must look out for foxes or owls in search of a meal.

GRASSLANDS

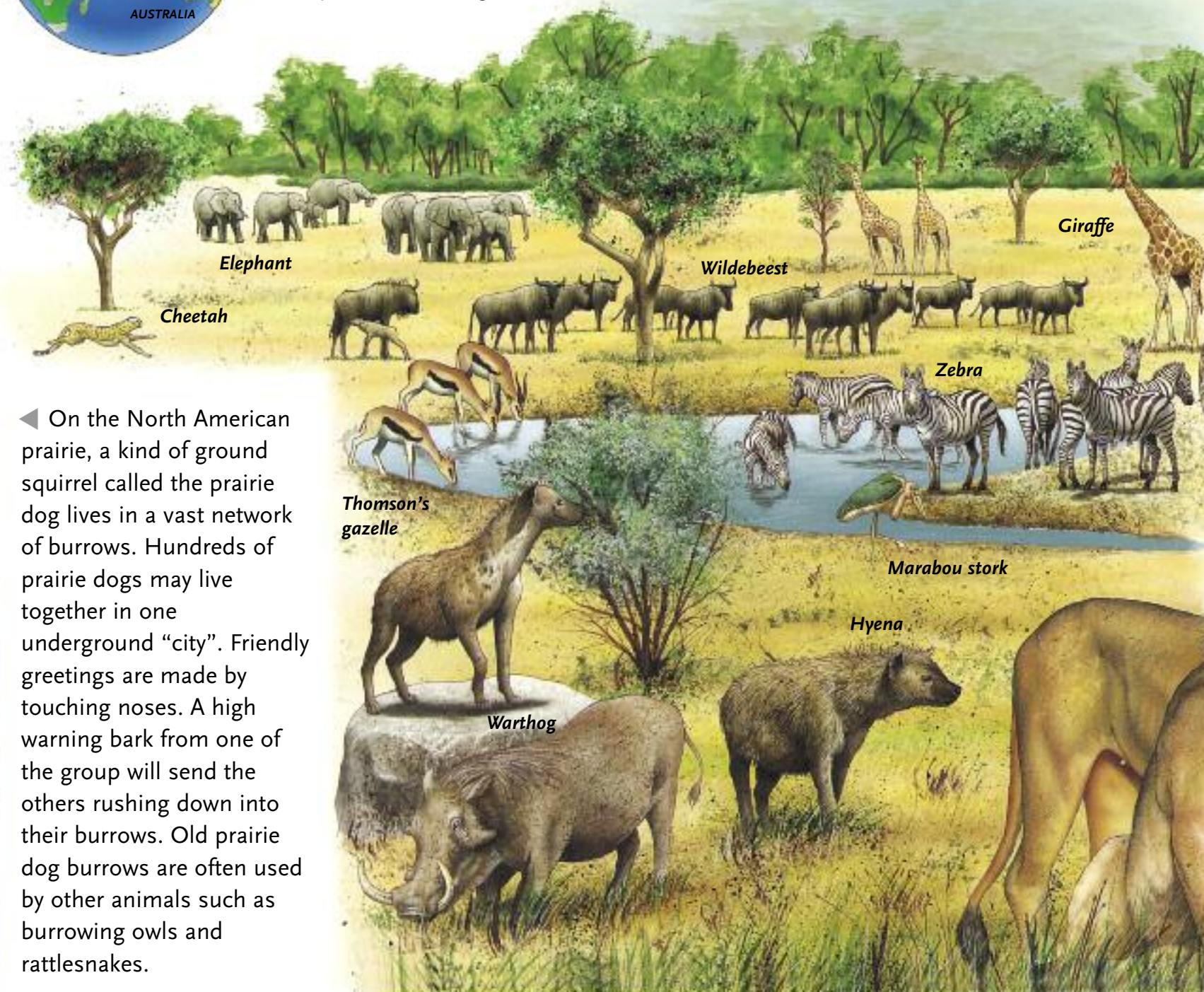
GRASSLAND is the name given to large areas of wild grass, with small plants and sometimes scattered trees.

Grasslands are found in areas where there is enough rainfall to stop the land becoming a desert, but not enough to support woodland or forest.

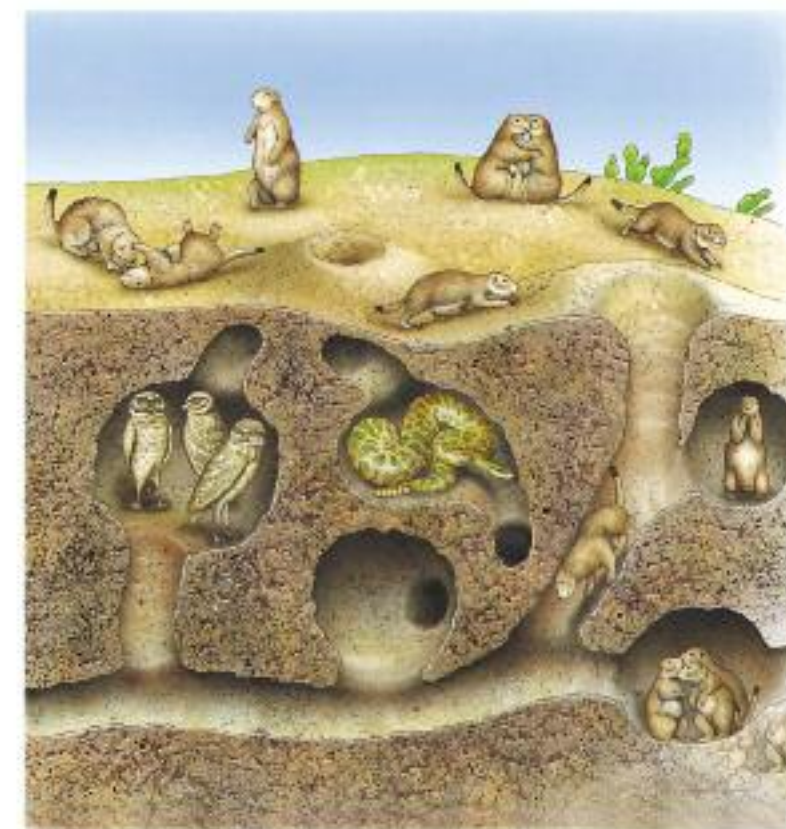
During the wet season in Africa, grasslands are green and rich with fresh new grass and plants. These are food for the many kinds of plant-eating animals that live there. The plant-eaters are themselves prey for meat-eaters such as lions, cheetahs or hyenas. In such an open landscape there is nowhere to hide from predators, so the only means of escape for plant-eaters is to run. Many live in herds, with one member always on the lookout for approaching danger.



Grasslands are found the world over. They are known as prairies in North America, steppes in Asia and pampas in South America. In Africa, the savannah, a mixture of grasses and trees, is rich with wildlife. Giraffes and elephants reach up to leaves in the trees. Zebras eat tall, coarse grass, leaving shorter grass for wildebeest, antelopes and warthogs.



A scene of the East African savannah grasslands, beneath the slopes of Kilimanjaro, Africa's highest mountain.



On the North American prairie, a kind of ground squirrel called the prairie dog lives in a vast network of burrows. Hundreds of prairie dogs may live together in one underground "city". Friendly greetings are made by touching noses. A high warning bark from one of the group will send the others rushing down into their burrows. Old prairie dog burrows are often used by other animals such as burrowing owls and rattlesnakes.

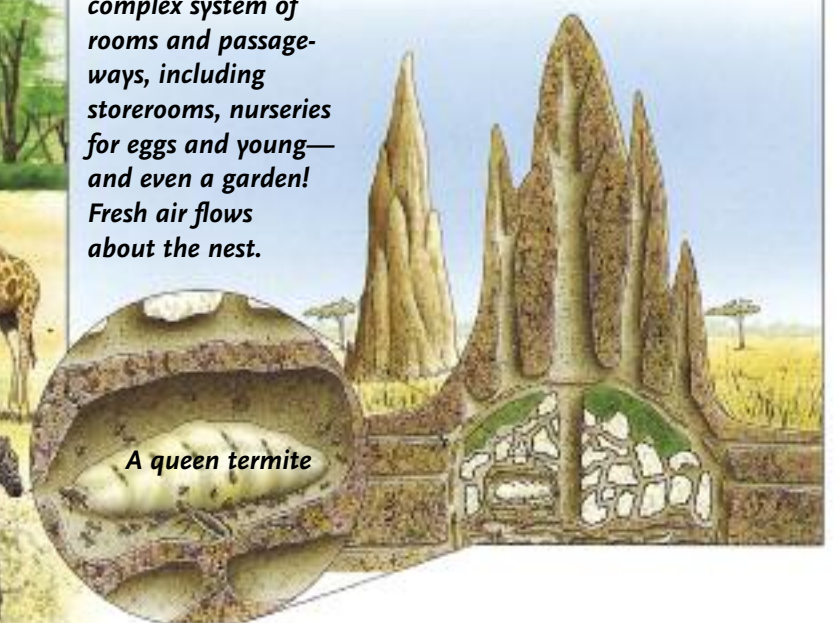
TERMITES

DOTTED around tropical grasslands are huge towers made of rock-hard soil. These are termite nests, which can be home to millions of termites. Deep inside the nest live the king and queen. The queen's huge body is full of eggs. Other termites, called workers, look after the young and go out to find food. The workers collect dead plant material and put it into moist chambers in the nest, where "gardens" of fungus soften the plant material ready for eating. Soldier termites stand guard outside the nest.



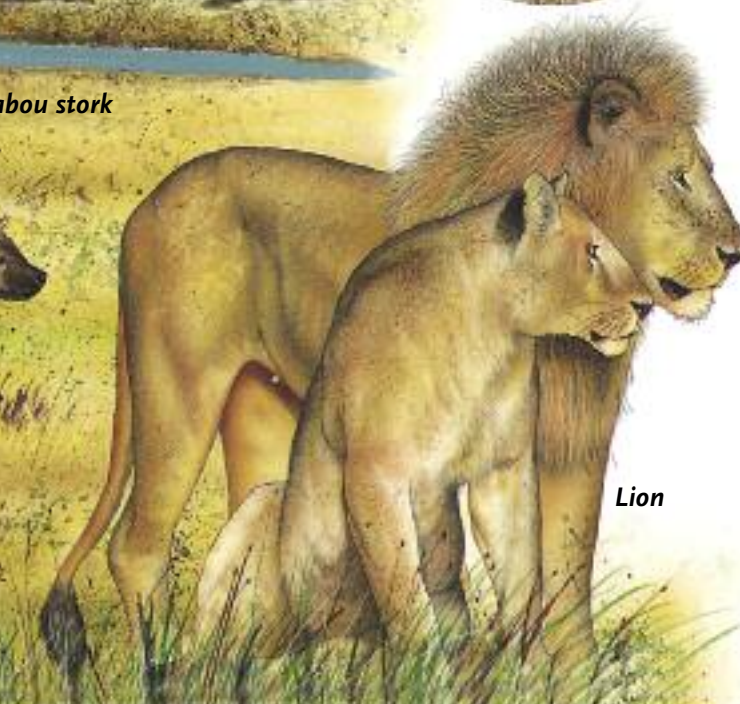
A soldier termite

Inside each tower is a complex system of rooms and passageways, including storerooms, nurseries for eggs and young—and even a garden! Fresh air flows about the nest.



A queen termite

The cheetah hunts by bringing down its prey after a chase. It can sprint faster than any other land animal, reaching 100 km/h for short distances. Lions usually live and hunt in groups called prides. It is the females that stalk and kill their prey. Hyenas have powerful jaws that allow them to crunch and swallow bones. Like marabou storks, they also feed on the leftovers of animals killed by others.



Lion

DESERTS

A DESERT is an area of land which has very little or no rainfall. Many deserts are hot places, bare and rocky or sometimes covered with sand. There are also cold deserts, such as the Gobi in Asia, where winters are bitterly cold.

In hot deserts, temperatures can soar to over 50°C during the day. There are no trees to give shade and very few places to find water. Even so, some kinds of plant and animal are still able to survive. Desert plants can take in water that condenses from dew or fog. The head-stander beetle from Africa stands on its head on foggy mornings to drink the condensation which trickles down its body.



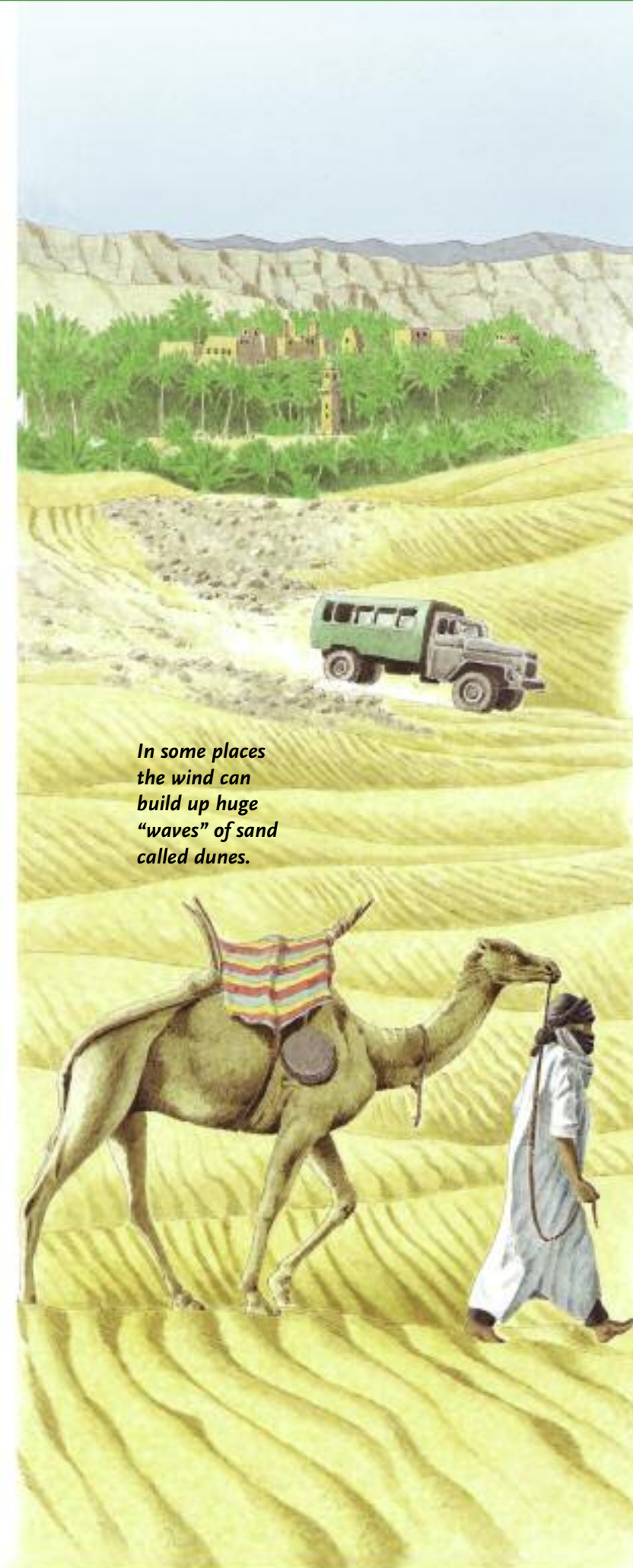
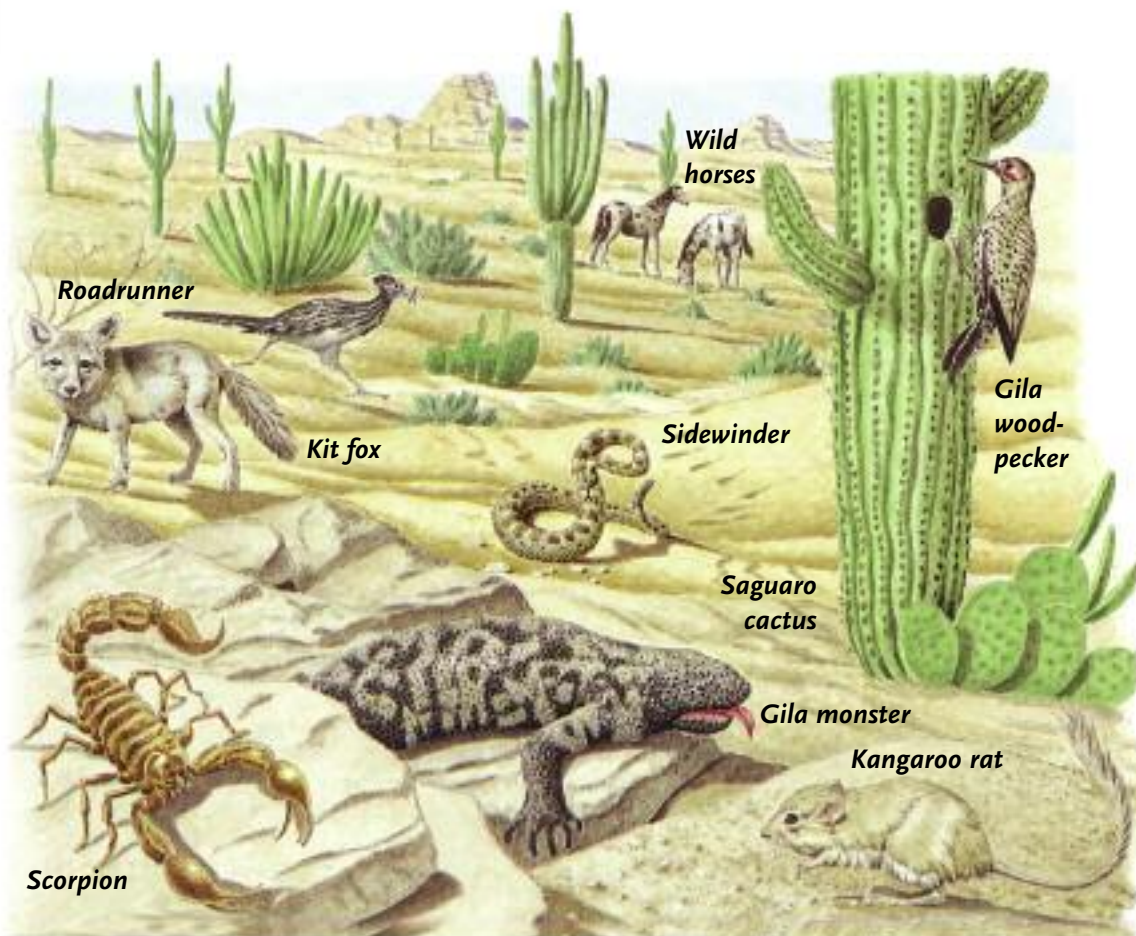
◀ Areas of desert are found in the west of the USA and South America, as well as in Asia, Australia and Africa. The largest and hottest desert in the world, the Sahara, is in northern Africa. Most of it is covered by rock or gravel, only one tenth by sand. At night, with no cloud cover, the ground

cools very quickly and temperatures drop to below freezing.



The addax, a rare antelope from the Sahara desert, does not need to drink. It survives on the moisture that is contained in the vegetation it eats.

◀ Cacti are common plants of the American desert. They collect water from dew or rain whenever it falls, and store it in their swollen stems. The saguaro can grow up to 15 metres tall. Many desert animals, such as the kangaroo rat and sidewinder, a kind of snake named after the way it moves across the ground, avoid the scorching daytime temperatures by hiding in burrows or under rocks. Cold-blooded reptiles, such as lizards, warm their bodies in the mornings before they can hunt.



In some places the wind can build up huge "waves" of sand called dunes.

GRAND CANYON

THE GRAND CANYON is a deep cleft in the desert of Arizona, USA. More than 350 kilometres long and about 1.6 kilometres deep, it began to be formed millions of years ago as the land around the Colorado River gradually rose up. The river started to flow faster and cut down deeper and deeper into the surrounding rock. Today, the Grand Canyon is so deep that we can see many different layers of sedimentary rock laid down in prehistoric times.



◀ The Sahara desert is an inhospitable place, but even so, people live there. Towns and villages have grown up around oases, places where underground water comes to the surface. Desert travellers like the Tuareg people once commonly used camels to carry their belongings or goods across the desert. Camels can travel for weeks without eating or drinking. Nowadays, most people use cars and lorries to cross the desert.



"Living stones" look just like pebbles when they are not in flower. They live off water trapped between cracks in rocks.

RAINFORESTS

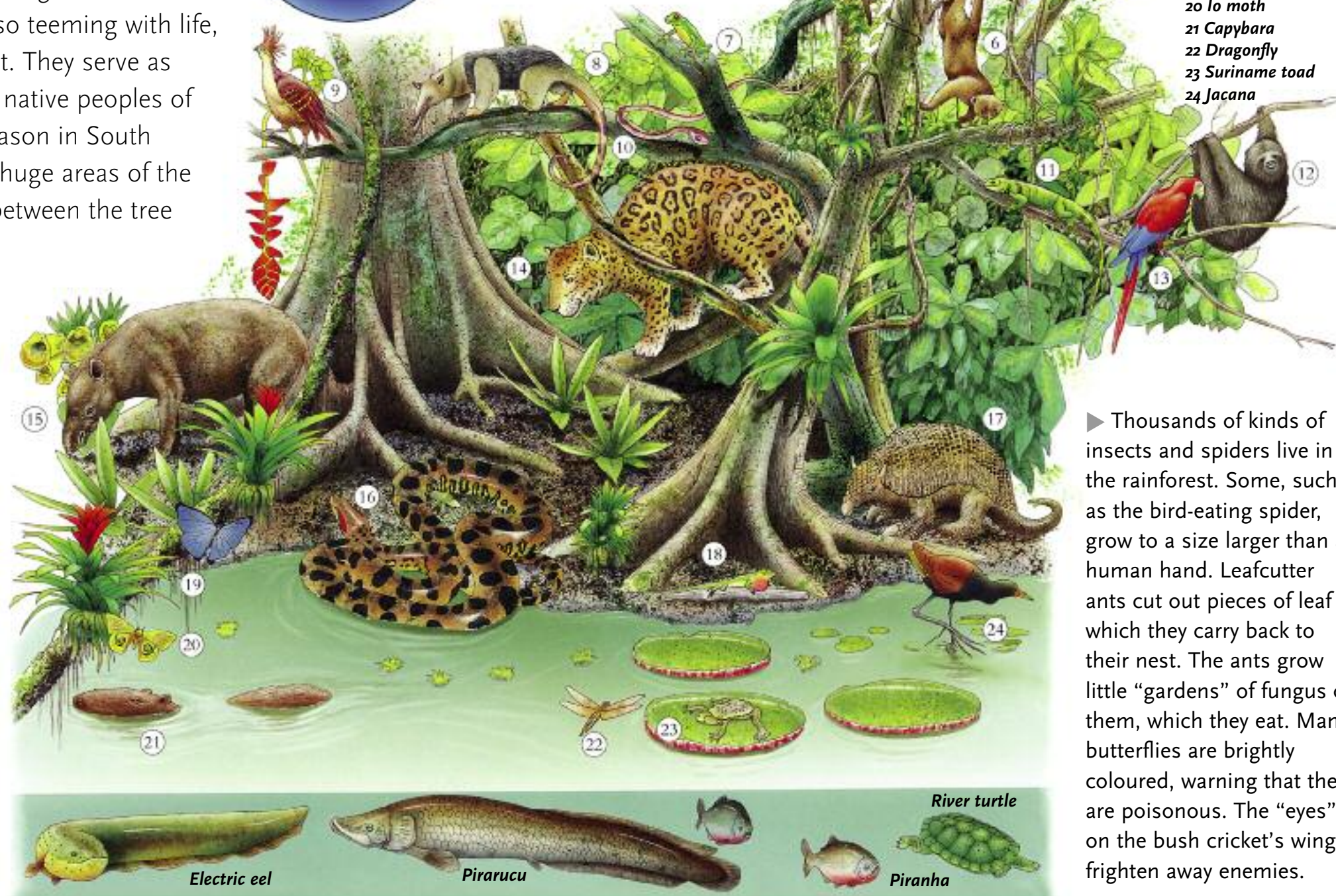
HALF OF all the plant and animal species in the world live in tropical rainforests. Heavy rainfall and high temperatures are ideal for many kinds of plant and animal to thrive. Tall trees reach up to form a thick roof of branches called the canopy. Many animals live there, feeding on fruits and flowers. Beneath the canopy is a layer of lower trees. The forest floor is dark, as little light can reach through the trees.

Rivers and streams, also teeming with life, run through the rainforest. They serve as forest “highways” for the native peoples of the forest. In the rainy season in South America, the rivers flood huge areas of the forest, and fish swim in between the tree trunks.

► High up in the canopy of the Amazon rainforest, birds feed on fruits, insects and small mammals. Monkeys swing through the trees, while sloths hang almost motionless. On lower branches, the jaguar lurks silently in wait for its prey—a shy tapir, perhaps. Coiled up on the river’s edge is a massive anaconda snake. The Amazon rivers and streams are home to fierce piranhas that can reduce a large animal to a skeleton in minutes, and to electric eels that stun their victims before devouring them.



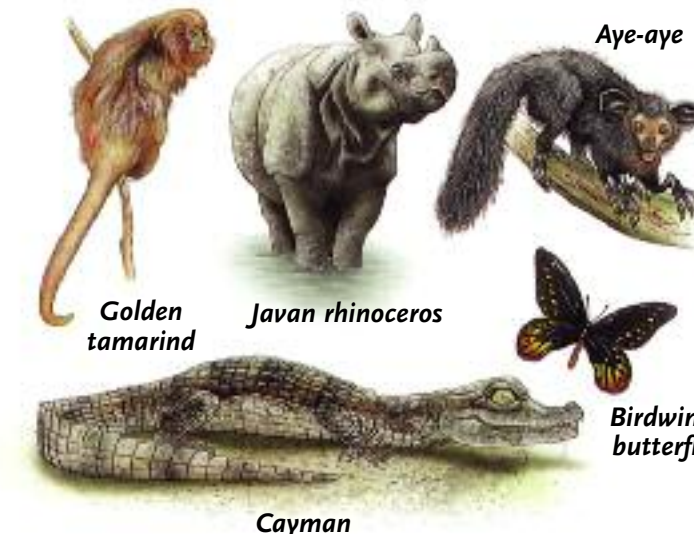
◀ Tropical rainforest is found in lands near the Equator wherever there is high rainfall. The largest area is in the Amazon basin of South America. Other rainforests are in Central America, Southeast Asia, the western part of central Africa, eastern Madagascar and northern Australia. In many of these places, wide areas of forest have been cut down.



KEY

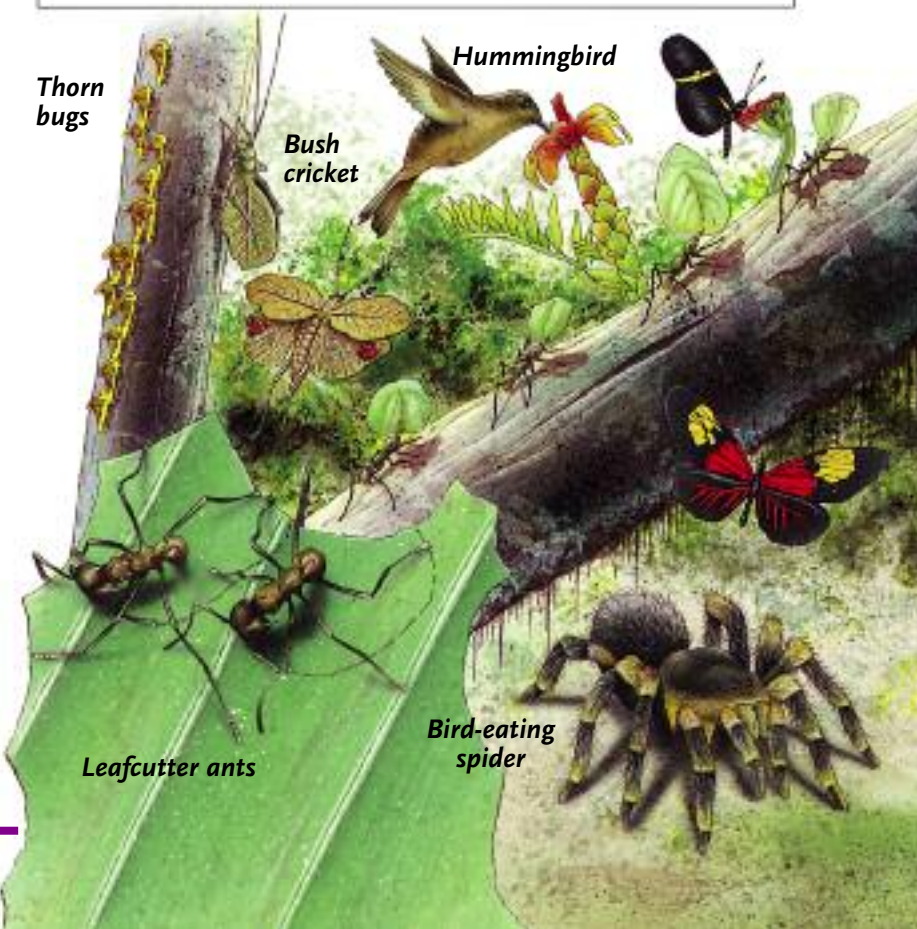
- 1 Harpy eagle
- 2 Howler monkey
- 3 Spider monkey
- 4 Toucan
- 5 Squirrel monkey
- 6 Kinkajou
- 7 Tree frog
- 8 Tree anteater
- 9 Hoatzin
- 10 Tree snake
- 11 Tree iguana
- 12 Sloth
- 13 Scarlet macaw
- 14 Jaguar
- 15 Tapir
- 16 Anaconda
- 17 Armadillo
- 18 Anole lizard
- 19 Morpho butterfly
- 20 Lo moth
- 21 Capybara
- 22 Dragonfly
- 23 Suriname toad
- 24 Jacana

LAST CHANCE TO SEE...



EVERY DAY, large areas of rainforest all over the world are being destroyed by people. Trees are cut down to make furniture and other wood products, and to clear space for mining, roads and cattle farming. As the rainforest disappears, many animals are left homeless. Some species, such as those pictured above, are in danger of dying out altogether. Breeding programmes in zoos and reserves have helped to keep some species alive. However, many rainforest animals and plants disappear even before we have the chance to discover them.

► Thousands of kinds of insects and spiders live in the rainforest. Some, such as the bird-eating spider, grow to a size larger than a human hand. Leafcutter ants cut out pieces of leaf which they carry back to their nest. The ants grow little “gardens” of fungus on them, which they eat. Many butterflies are brightly coloured, warning that they are poisonous. The “eyes” on the bush cricket’s wings frighten away enemies.

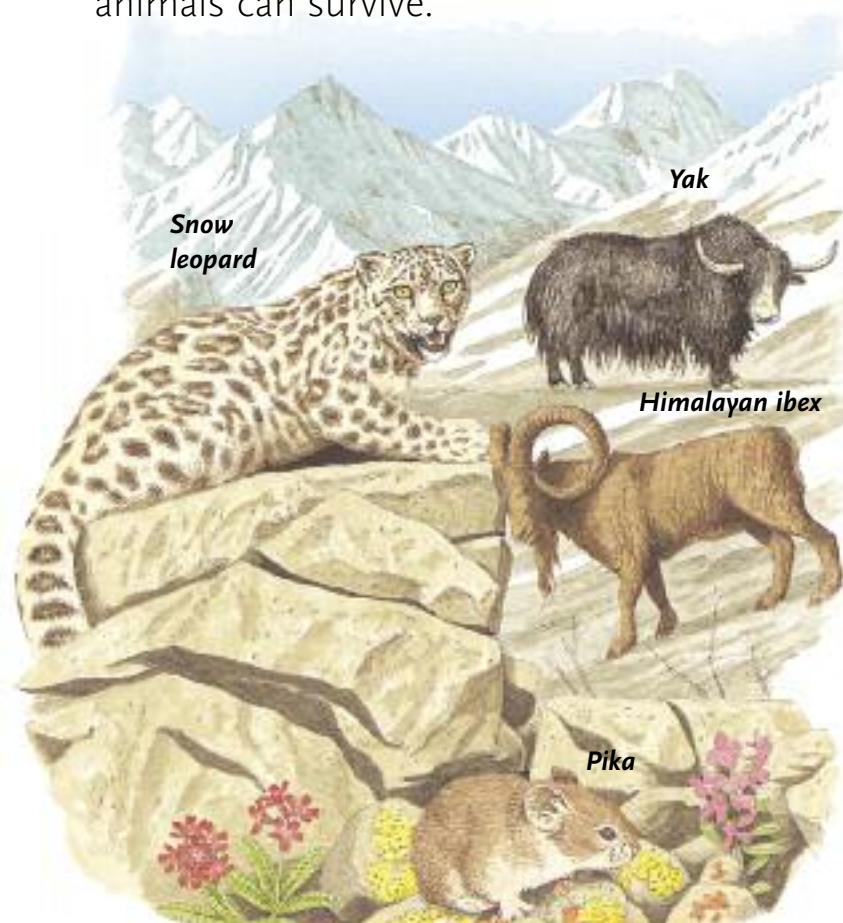


MOUNTAINS

WHEN THE plates of the Earth (the great slabs into which its crust is divided) push against one another, the land “folds up” like a rug on the floor. This is how many mountain ranges are formed. It all takes millions of years to happen. Great mountain ranges of the world include the Andes in South America, the Rockies in North America, the Alps in Europe and the Himalayas in Asia.

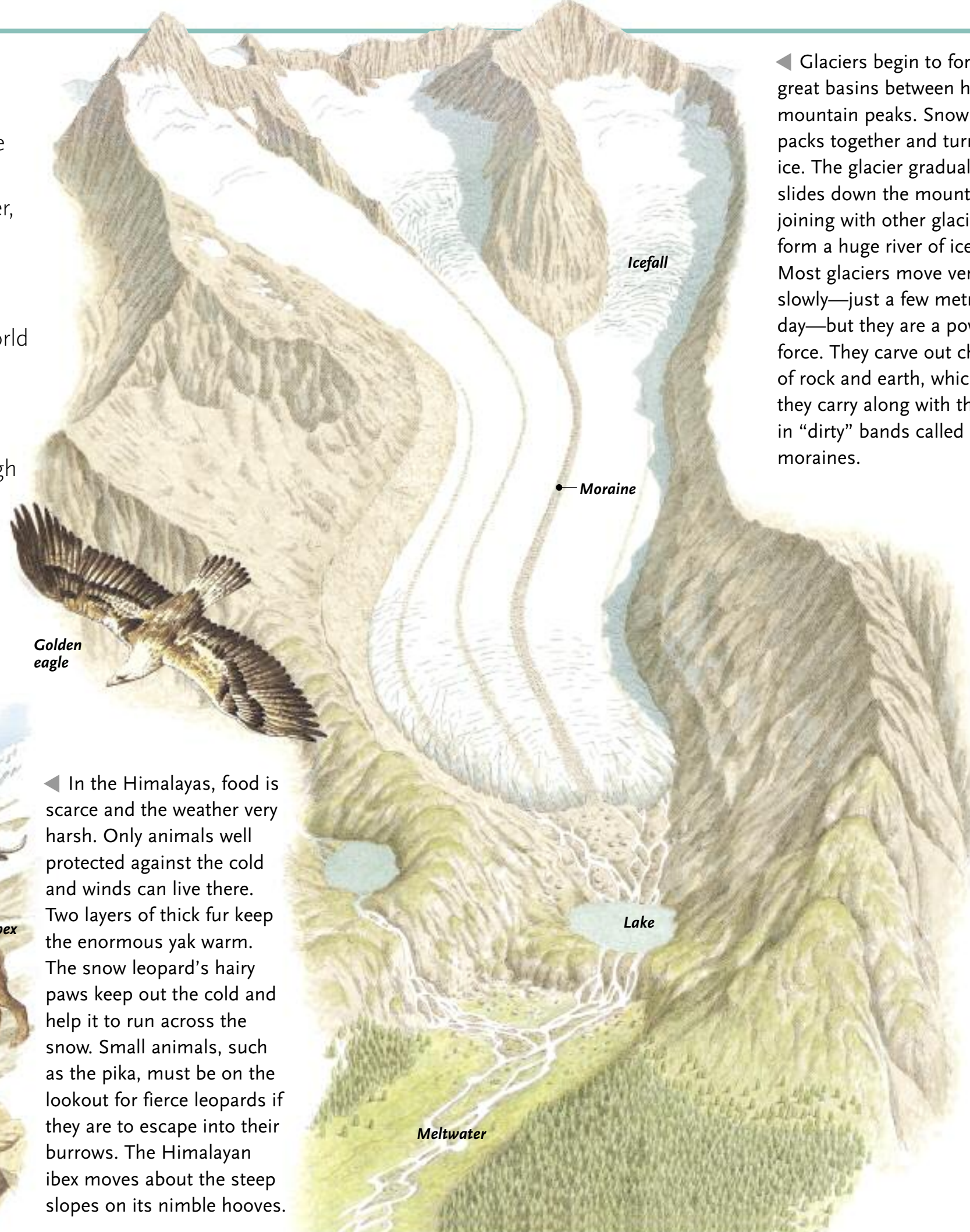
The tops of some mountains are so high that they are covered in snow and ice all year round. There is less oxygen in the air to breathe. Nothing can live there for long. Even on the lower slopes where the snow melts in warmer months, only the toughest plants and animals can survive.

18



Golden eagle

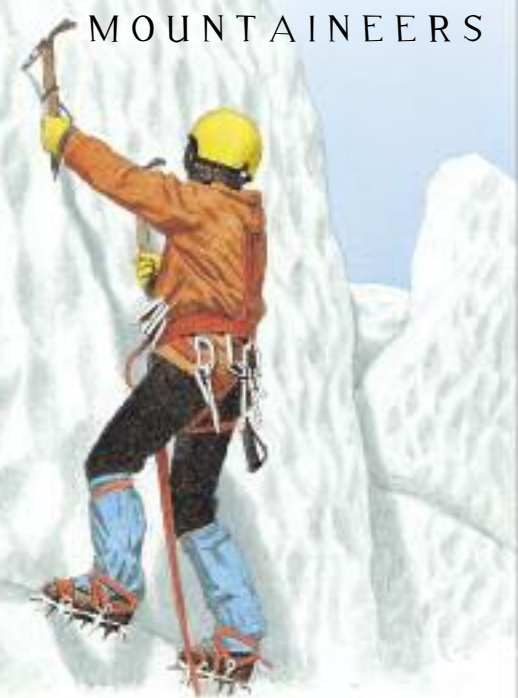
◀ In the Himalayas, food is scarce and the weather very harsh. Only animals well protected against the cold and winds can live there. Two layers of thick fur keep the enormous yak warm. The snow leopard’s hairy paws keep out the cold and help it to run across the snow. Small animals, such as the pika, must be on the lookout for fierce leopards if they are to escape into their burrows. The Himalayan ibex moves about the steep slopes on its nimble hooves.



◀ Glaciers begin to form in great basins between high mountain peaks. Snow packs together and turns to ice. The glacier gradually slides down the mountain, joining with other glaciers to form a huge river of ice. Most glaciers move very slowly—just a few metres a day—but they are a powerful force. They carve out chunks of rock and earth, which they carry along with them in “dirty” bands called moraines.

Mountaineers wear special clothes to protect themselves from the cold. They often carry supplies with them, including ice axes and ropes. Boot spikes called crampons help them climb up steep icy slopes.

MOUNTAINEERS



SOME PEOPLE have an ambition to climb one of the world’s highest mountains. Such a difficult and dangerous journey seems worthwhile when they finally reach the top. At very high altitudes, the air is thin (lacking in oxygen). Mountaineers used to carry oxygen tanks to help them breathe. Nowadays, most prefer to do without, allowing their bodies to become used to the thin air instead.

19

► The highest mountain in the world, Mount Everest, lies in the Himalayas. In 1953 Edmund Hillary and Sherpa Tenzing Norgay became the first people to climb to the top. Both K2, the second highest mountain, and the Matterhorn in the Alps are very dangerous mountains to climb. The highest summit in Africa, Kilimanjaro, is a volcano. In AD 79 a huge eruption of the volcano Vesuvius buried the Roman city of Pompeii in ash and rock.

Everest (8848 m)
K2 (8611 m)

Kilimanjaro
(5896 m)

Matterhorn
(4478 m)

Vesuvius (1277 m)

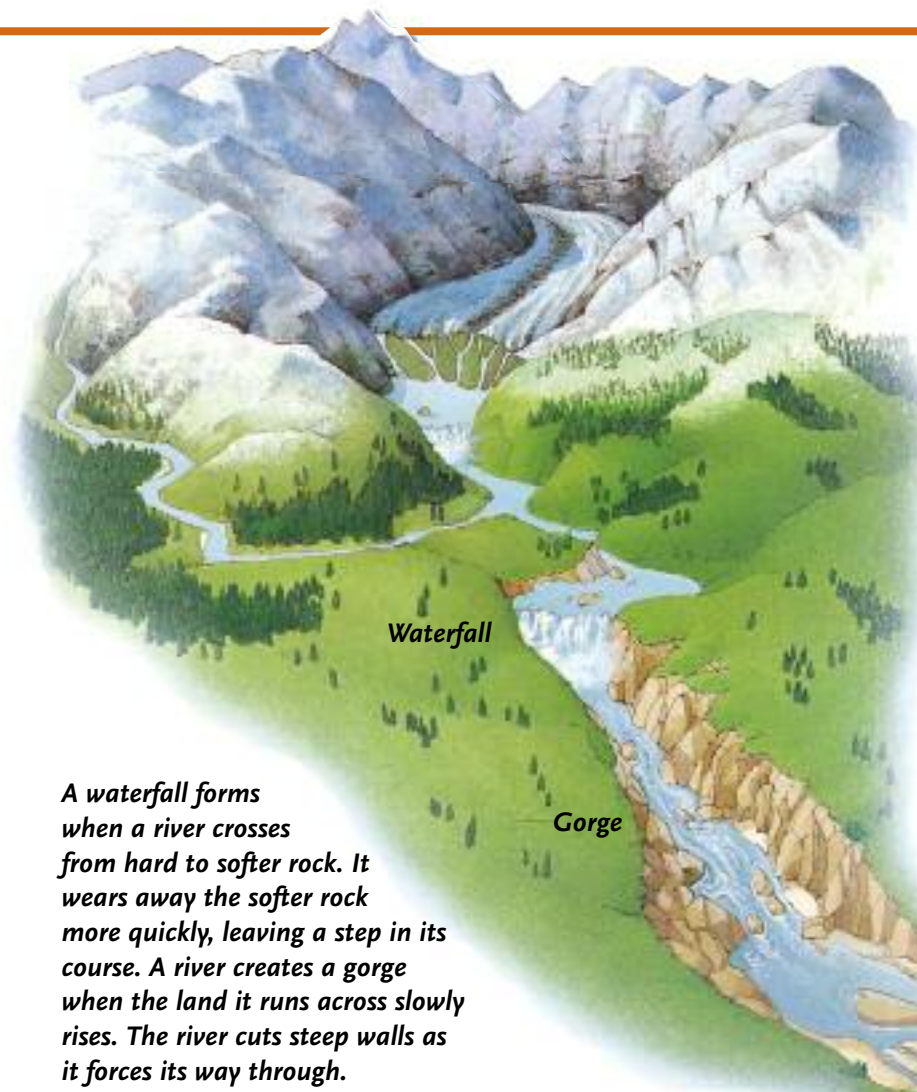


RIVERS

RIVERS are natural channels of water that run downhill. They are an essential link in the water cycle.

A river starts as a spring, meltwater from a glacier, or simply from rainwater collecting on sodden ground that has soaked up all the water it can. Near its source, the small river, often called a stream or a brook, flows quickly. Streams eventually join together to form a larger, slower river that runs to a lake or the sea.

The force of the running water and the stones it carries help the river to wear away the underlying rock, a process called erosion. The rock fragments are ground up and swept away downstream. Over millions of years, a river may carve out a wide valley.

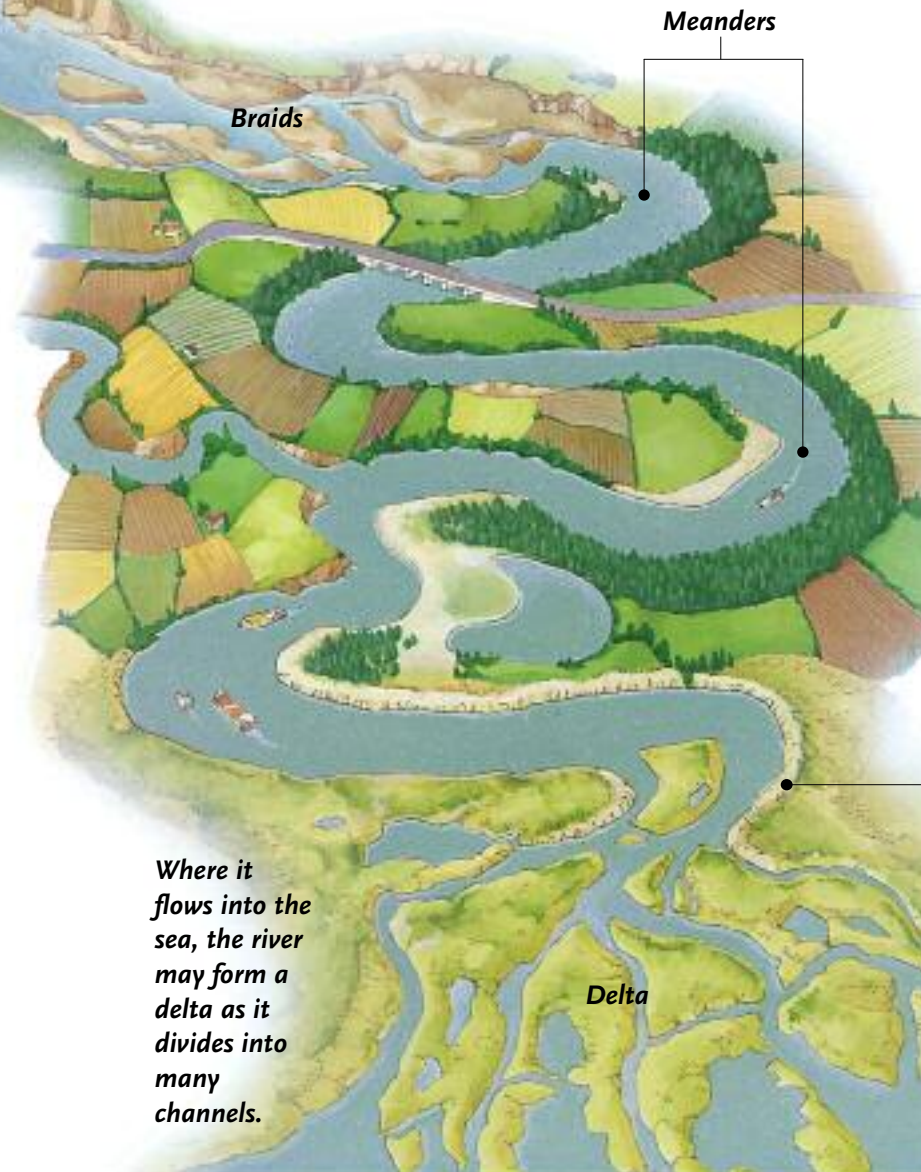


A waterfall forms when a river crosses from hard to softer rock. It wears away the softer rock more quickly, leaving a step in its course. A river creates a gorge when the land it runs across slowly rises. The river cuts steep walls as it forces its way through.

► A dam is a large barrier built across a river. Some water is allowed to flow past the dam, but most builds up behind it to form a lake or reservoir. The water is used for supplying drinking water to cities, for watering cropfields or to prevent flooding further downstream. Sometimes the water gushing through the dam can be used to turn great wheels called turbines and produce electricity.



A river may divide into criss-crossing smaller channels called braids.



Where it flows into the sea, the river may form a delta as it divides into many channels.

WETLANDS

WETLANDS are found on the edge of lakes, near to the seashore, or where rainwater or rivers flood the land. Many plants and animals thrive in the waterlogged conditions, although some are threatened with extinction as wetlands are frequently turned over to farming or building land.

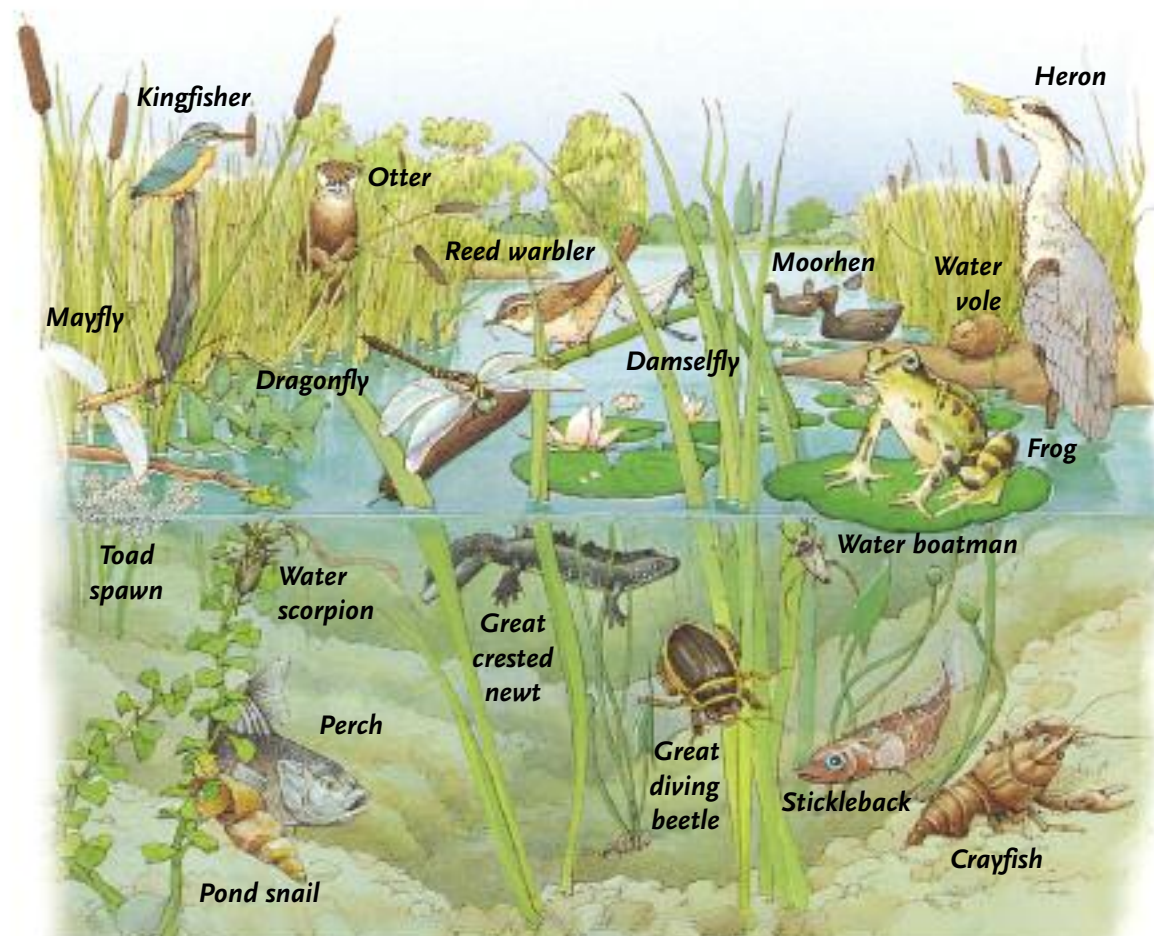
The Everglades of Florida, USA, is an area of slow-flowing water. The swamps are a haven for many animals, including wading birds and alligators. The waters rise and fall according to the seasons.



The river water may flood its plain, dumping sediments near its banks and building up ridges known as levees.

Levees

◀ Further along its course, other streams and rivers, called tributaries, join the river. It becomes wider, deeper and more slow-moving. Some of the eroded fragments of rock it has been carrying are laid down on its bed as sediments. The river winds across a broad plain in a series of looping bends called meanders.



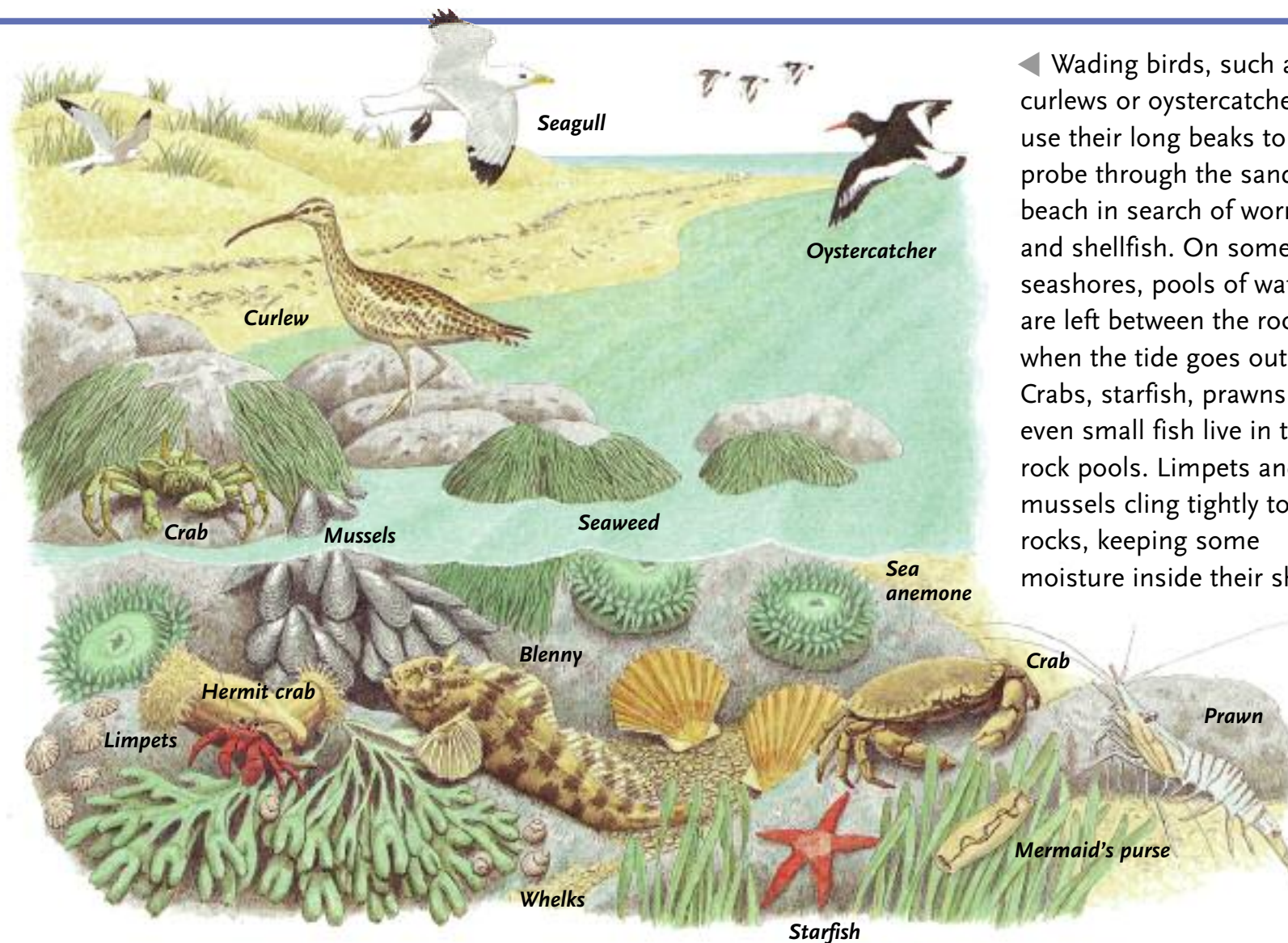
◀ Rivers are home to many plants and animals, both above and below the water. A fast-flowing stream is too rough, but in gentler, deeper water plants can take root in a muddy river bed. They provide food, shelter and nesting sites for many animals. Worms and snails living in the mud are food for fish, which, in turn, are eaten by otters and diving birds such as the kingfisher. Mayflies and other insects living at or near the water's surface are preyed upon by other insects such as dragonflies, as well as by birds, fish and frogs.

SEASHORE

THE SEASHORE is the place where land meets sea. This can be rocky cliffs, sandy or pebble beaches, or marshy wetlands.

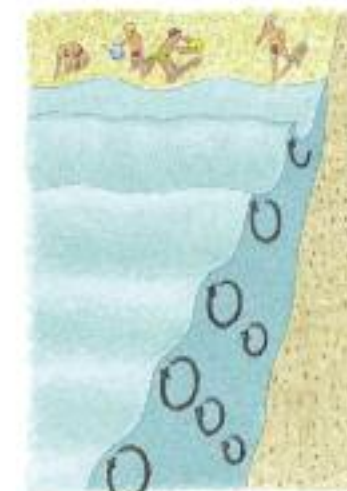
At high tide, much of a low-lying seashore is under water. The sea carries sand, pebbles and other material which it leaves on the shore. It also brings tiny particles of food for the many small creatures that live in the sand or on the rocks. These creatures are, in turn, prey for crabs, starfish and seabirds.

Seashore plants, such as seaweed, do not put down roots into the ground like other plants, but anchor themselves to rocks instead. Many kinds stay moist even after the tide has gone out, providing small animals with shelter from the sun.



◀ Wading birds, such as curlews or oystercatchers, use their long beaks to probe through the sand on a beach in search of worms and shellfish. On some seashores, pools of water are left between the rocks when the tide goes out. Crabs, starfish, prawns and even small fish live in these rock pools. Limpets and mussels cling tightly to the rocks, keeping some moisture inside their shells.

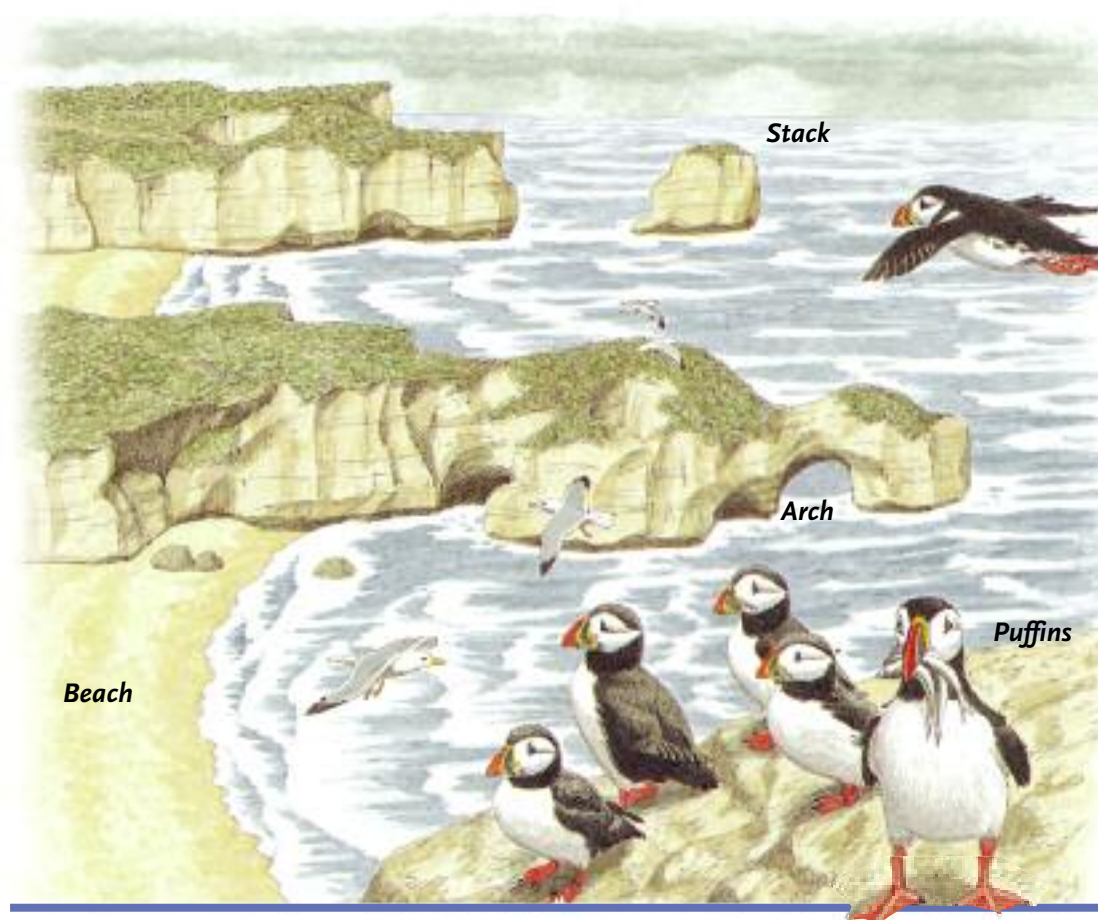
◀ As powerful waves crash against the cliffs, they gradually wear away the rocks. Sometimes the waves carve a hole, or arch, right through a cliff face. If the roof of the arch later collapses, one side of the arch is left standing alone. This is called a stack. When pieces of rock fall into the sea, the waves grind them down into pebbles or sand and lay them down in sheltered places to form beaches. Seabirds nest on rocky shores. Most build them on precarious cliff faces, but puffins nest in burrows.



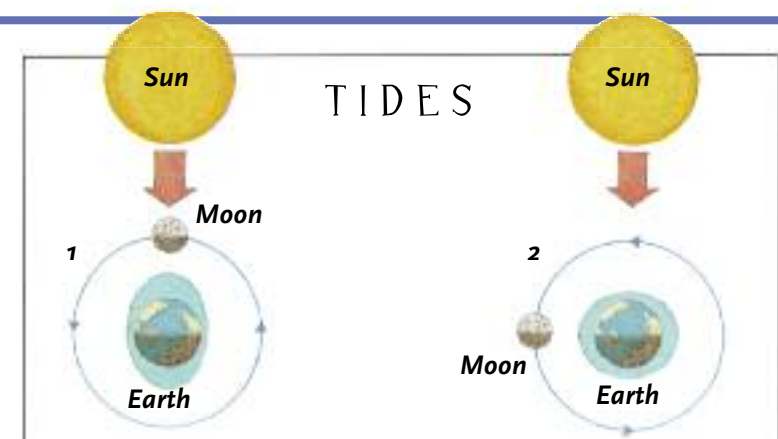
The water in a wave does not actually move forward. In shallow water close to shore, the lower part of a wave drags on the sea bed, causing the upper part, or crest, to topple over and the wave to "break".

◀ When the wind moves across the sea, the water turns over and over in circles, forming waves.

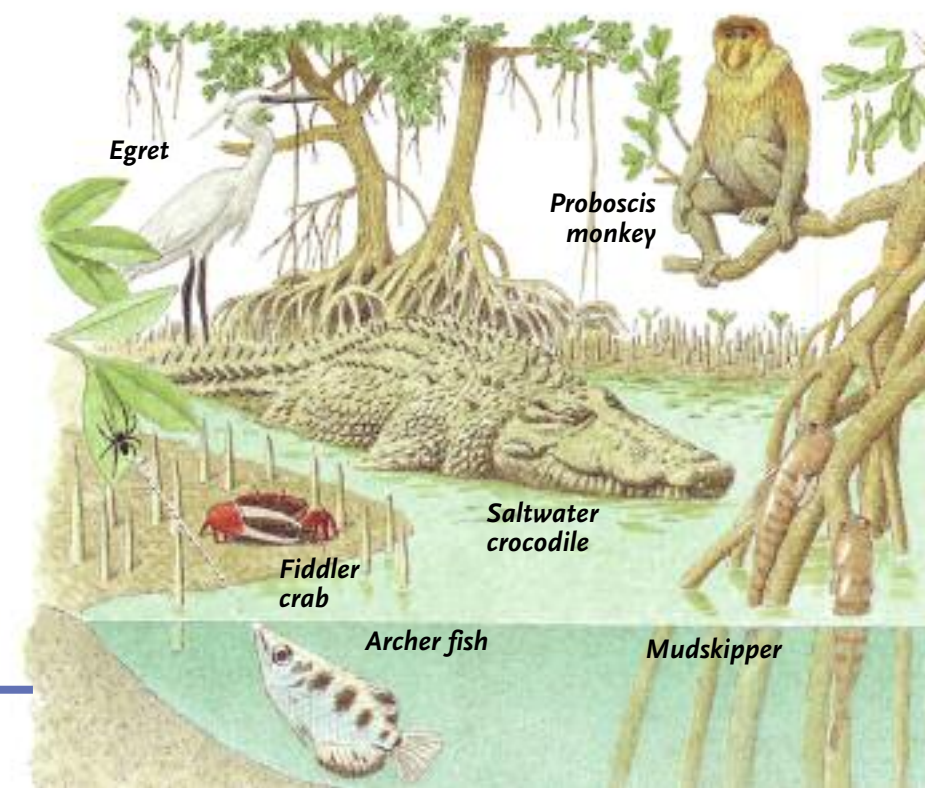
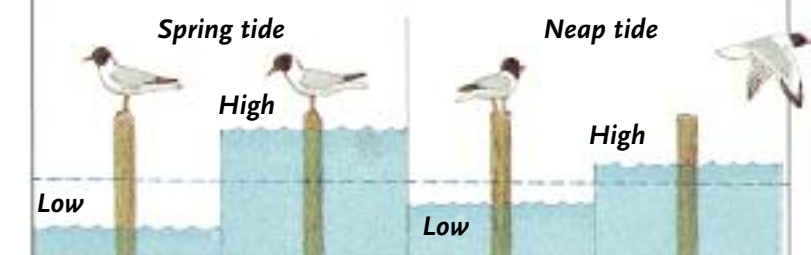
▶ Mangrove forests grow on sheltered coastlines in hot countries. South-east Asian mangroves are home to some unusual animals. When out of the water, the mudskipper fish uses its fins to "walk" across the mud and even climb trees. The archer fish "shoots down" insects with jets of water. The proboscis monkey swims across flooded areas of forest, but it is a target for hungry crocodiles.



TIDES



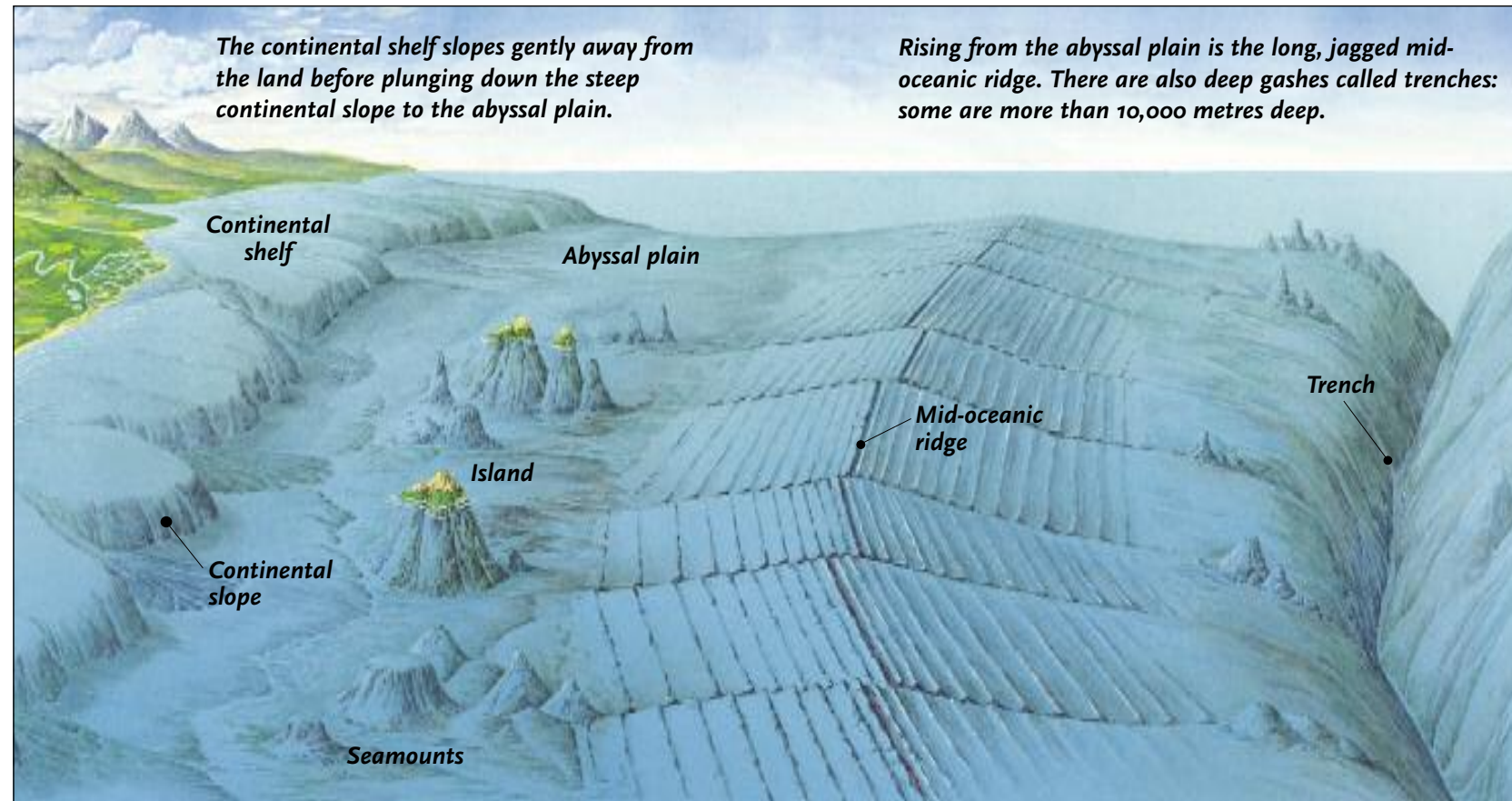
TIDES are caused by the pull of gravity by the Sun and Moon on the Earth. The ocean waters on the side of the Earth closest to the Moon (and the opposite side) bulge outwards, causing a high tide. At the same time, the rest of the Earth has a low tide. When the Sun, Moon and Earth are in line, the Sun's gravity combines with that of the Moon to increase the pull on the water. This makes high tides higher and low tides lower. These are called spring tides (1). When the Sun and Moon are not in line, the difference between high and low tides is not so great. These are called neap tides (2).



OCEANS

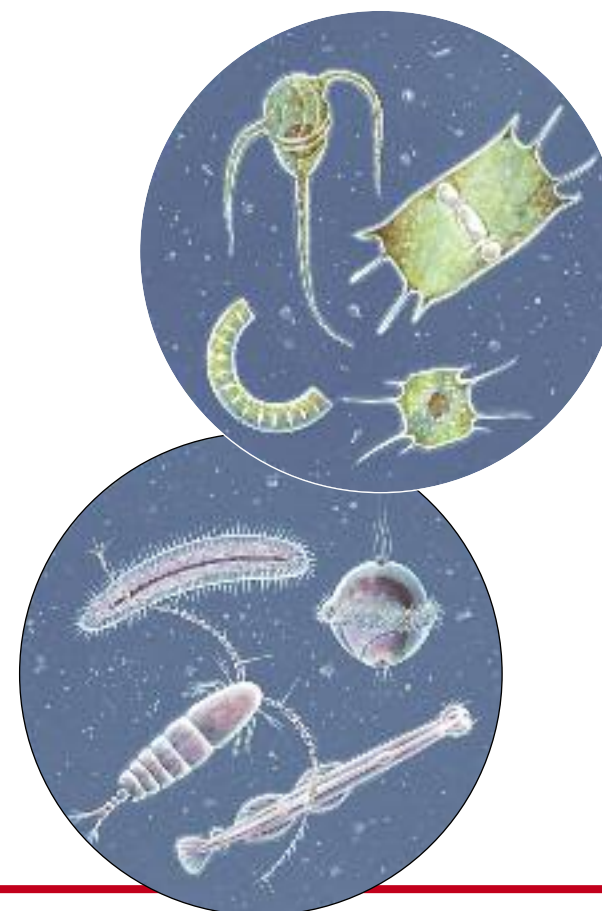
MORE than two-thirds of the Earth's surface is covered by vast expanses of salty water called oceans. The ocean floor lies thousands of metres under water. It is a realm of plains, trenches, ridges and volcanoes. Some volcanoes rise above the water, forming islands.

The water from the oceans plays a major part in creating the weather. Movements of ocean water around the Earth are called currents. These, both warm and cold, affect the climates of the lands they flow past. The oceans are also home to a wide variety of life, from microscopic plants to giant whales.



◀ The richest variety of life in the oceans is found in surface waters. Here, sunlight penetrates the water, allowing phytoplankton (see opposite) to grow. Phytoplankton are eaten by tiny animals called zooplankton that drift in currents. Fish and squid are predators of zooplankton. These, in turn, attract other predators, such as birds and fast-moving marlin or sharks. Fish also fall prey to sea turtles and mammals such as seals, dolphins and whales. The surface waters are home to some of the largest animals in the world. However, many of these giants, such as the sei whale, feed on tiny shrimp-like zooplankton called krill.

Phytoplankton (below) are microscopic plants that float in surface waters. They use sunlight and nutrients dissolved in the water to make their food. They are eaten by zooplankton (bottom), tiny animals that include fish larvae and copepods, relatives of crabs and shrimps.

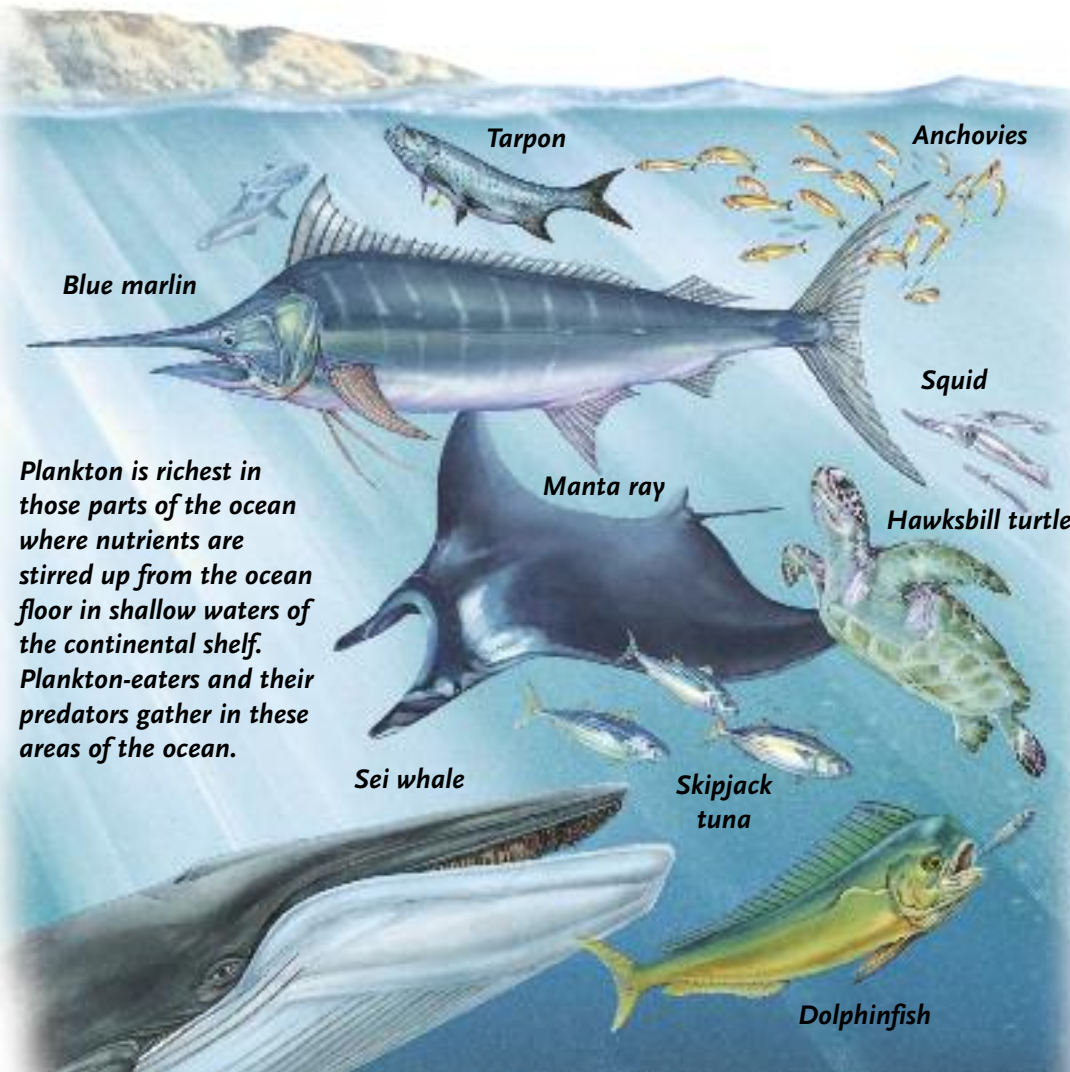
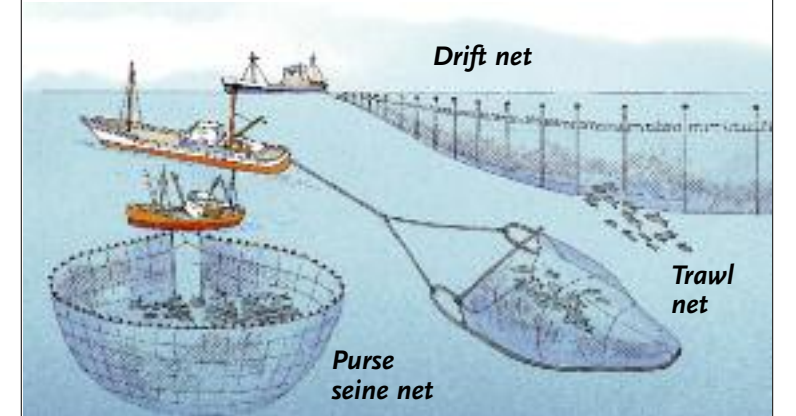


► Deep below the surface of the oceans, the water is dark and cold. It is the domain of some very weird-looking creatures. The huge jaws and stretchy stomach of the gulper eel allow it to eat fish much larger than itself. The viperfish has long, sharp teeth for grabbing and holding prey. The glowing rod on the head of the anglerfish attracts small fish which it then devours. The tripod-fish stands on its stilt-like fins on the ocean bed, ready to pounce. The giant sea spider feeds on worms which live in the mud.



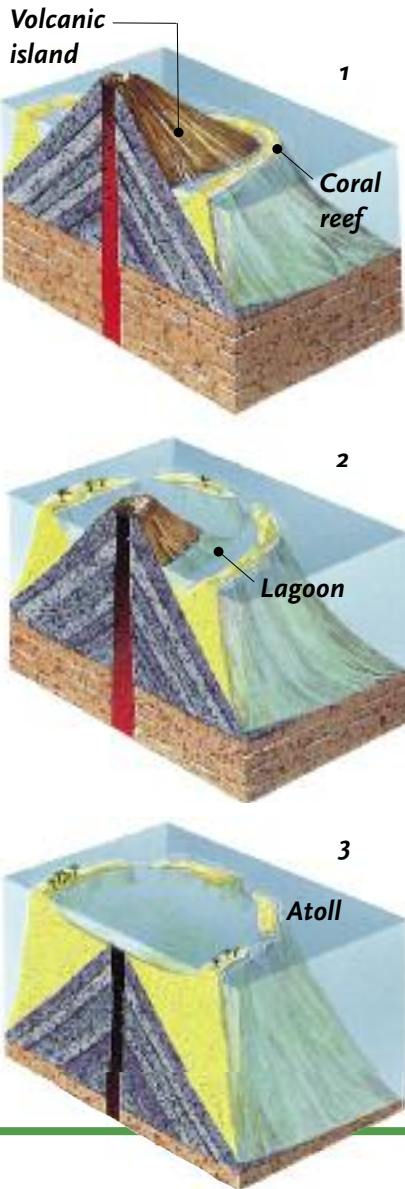
FISHING

FOR THOUSANDS of years, people have caught fish with hooks, spears and nets. Modern fishing boats can catch huge quantities of fish with their large nets and special equipment. Fish that live near the surface are caught with purse seine nets. The net is spread around the fish and the ends pulled together, trapping the fish inside. Trawl nets are dragged along the sea bed. Drift nets hang in the sea and drift with the tide. They catch anything that swims into them, including dolphins, turtles and diving birds.

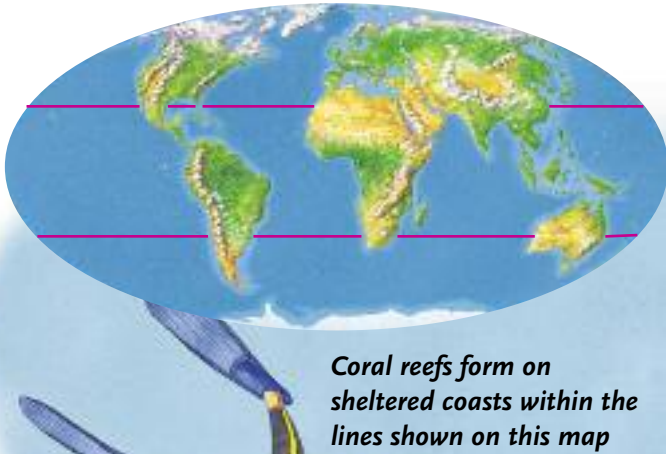


CORAL REEFS

CORAL is found in tropical shallow waters around volcanic islands or close to rocky mainland coastlines. It is made from the layers of skeletons of tiny animals called polyps. Over many years, colonies of polyps can build up great banks of coral, known as reefs. There are many different kinds of corals, and their bright colours make a coral reef look like an undersea garden. Only the living surface of the coral is coloured—the layers of dead skeletons underneath are white. The living layer of tiny polyps feed on zooplankton that drift by in the current.



Many oceanic islands are the tips of volcanoes. In warm, shallow, tropical waters, billions of coral skeletons build up to form massive coral reefs around the coastlines of these islands (1). An extinct volcano will eventually start to sink back into the ocean floor. But coral polyps must stay near the light, so they build up the reef taller and taller in order to stay in sunlit waters. This forms a circular reef enclosing a lagoon that surrounds the disappearing volcanic island (2). The volcano's tip eventually sinks beneath the ocean waves. A ring of coral islands, called atoll, is left behind (3).

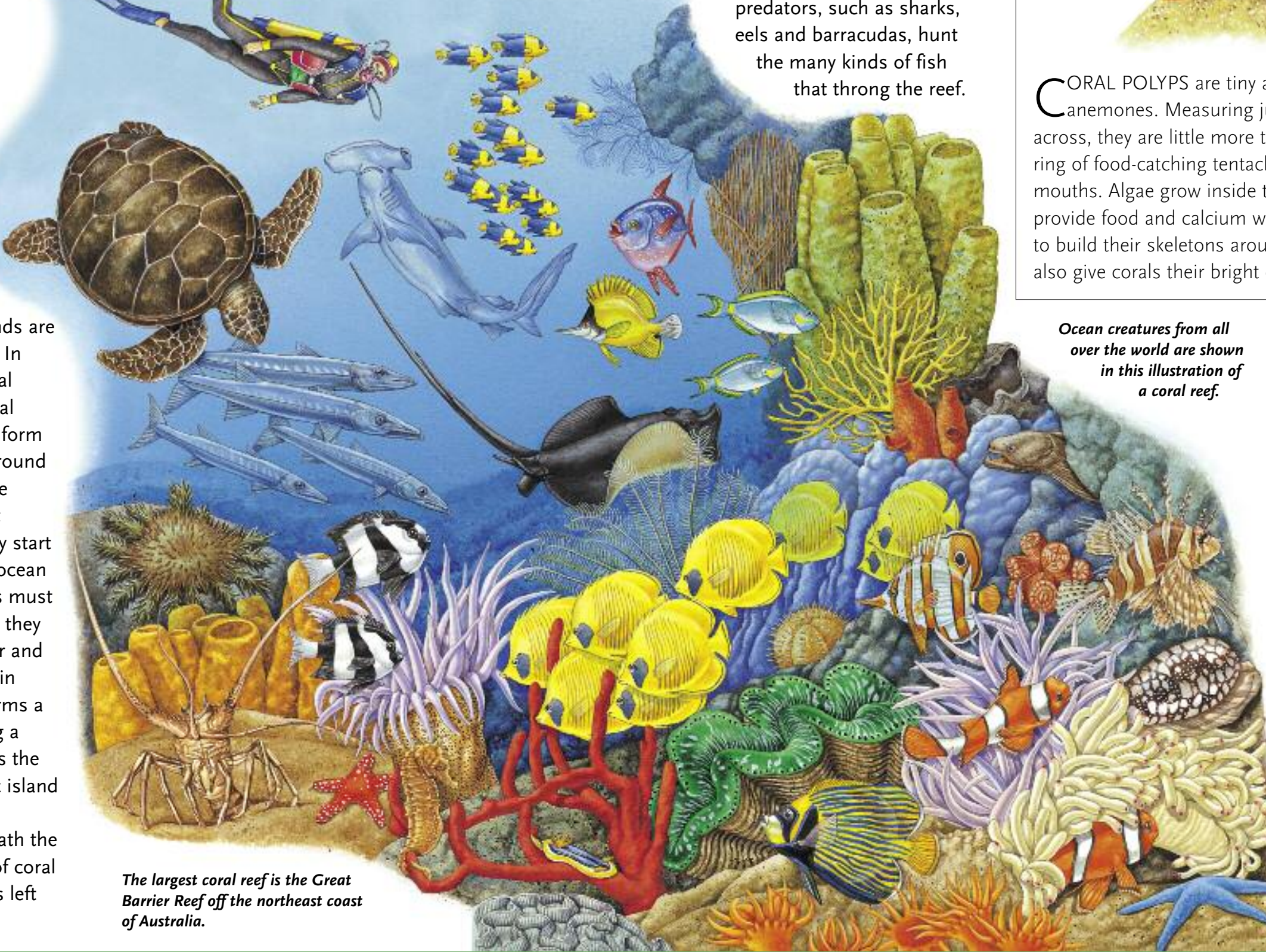


▼ Coral reefs are crowded with animal life. Tiny plants called algae, which live on the bodies of the coral, are food for zooplankton, as well as for fish and sea urchins. The crown-of-thorns starfish and the parrotfish feed on the coral itself. The largest predators, such as sharks, eels and barracudas, hunt the many kinds of fish that throng the reef.

CORAL POLYPS



CORAL POLYPS are tiny animals related to sea anemones. Measuring just a few millimetres across, they are little more than stomachs with a ring of food-catching tentacles around their mouths. Algae grow inside the polyps. They provide food and calcium which the polyps need to build their skeletons around their bases. Algae also give corals their bright colours.



The largest coral reef is the Great Barrier Reef off the northeast coast of Australia.

- KEY
- 1 Angelfish
 - 2 Marine turtle
 - 3 Hammerhead shark
 - 4 Gorgonian coral
 - 5 Sponges
 - 6 Kingfish
 - 7 Butterflyfish
 - 8 Parrotfish
 - 9 Barracuda
 - 10 Eagle ray
 - 11 Moray eel
 - 12 Crown-of-thorns starfish
 - 13 Damselfish
 - 14 Feather star
 - 15 Butterflyfish
 - 16 Sea urchin
 - 17 Daisy coral
 - 18 Lionfish
 - 19 Sea anemone
 - 20 Giant clam
 - 21 Clownfish
 - 22 Baler shell
 - 23 Spiny lobster
 - 24 Starfish
 - 25 Seahorse
 - 26 Sea slug
 - 27 Red sponge
 - 28 Angelfish

GLOSSARY

Abyssal plain A large, flat region of the ocean floor lying mainly between 4000 and 5000 metres below the ocean surface.

Algae Plants without true stems, roots and leaves, found in water or moist ground. They include tiny, often single-celled plants known as phytoplankton.

Atoll A ring of coral islands left behind when an undersea volcano sinks below the ocean's surface.

Braids Small, criss-crossing channels in a river.

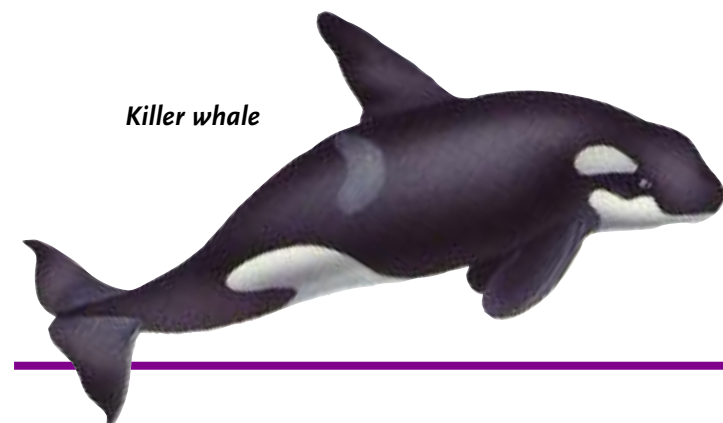
Carbon cycle The cycle of carbon in the natural world. Plants take in carbon during photosynthesis, in the form of carbon dioxide gas in the air, and use it to build their body parts. Animals eat the plants and use these carbon-based substances to make and maintain their own body parts and gain energy. This produces carbon dioxide as a waste gas. It is breathed into the air once again.

Climate The pattern of weather in a particular region of the world over a long period of time.

Continental shelf The part of a continent that lies beneath ocean waters.

Continental slope The steep part of the continental shelf that plunges down to the abyssal plain.

Coral The skeletons of colonies of tiny animals called polyps.



Currents In oceans, the flowing bands of water that swirl around the globe.

Dam A large barrier built across a river to form a lake or reservoir, or to generate electricity.

Delta Where a river flows into the sea and divides into many channels, usually in a fan-like shape.

Desert An area of land with little or no rainfall. Without water to moderate the temperature, deserts can be extremely hot or extremely cold (and sometimes both, depending on whether it is day or night).

Environment The living and non-living surroundings of an organism.

Equator An invisible line around the Earth, lying equally distant from both poles.

Erosion The gradual wearing away of rock or soil by moving water or wind.

Estuary An area where a river meets the sea, mixing fresh water and salt water.

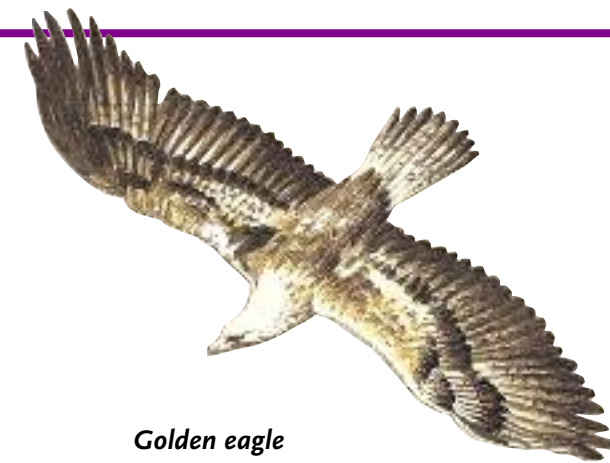
Extinction The process whereby every member of a group dies out (becomes extinct).

Food chain The sequence in which a plant is eaten by an animal, which is then eaten by another animal, and so on.

Fungi Living things, such as mushrooms, that feed on rotting plant and animal material and reproduce by shedding spores

Graze To feed on grasses.

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



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

Invertebrates Animals without backbones. They include insects, spiders, shellfish, worms and sponges.

Krill Small, shrimp-like plankton that form a large part of the diet of many ocean animals, including the great whales.

Larvae The immature forms of some animals, such as insects.

Microbes Organisms of microscopic size, such as bacteria.

Mid-oceanic ridge A long mountain range running along the ocean floor.

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

Minerals Non-living substances made of natural chemical elements.

Nutrients Substances (including minerals) needed to maintain an organism's bodily activity and new growth.

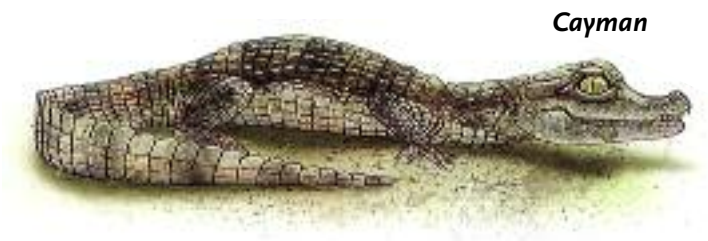
Nocturnal Active during the night and inactive during the day.

Organism Any living thing.

Photosynthesis The process by which green plants use sunlight as an energy source to turn carbon dioxide and water into the sugars, their food.

Plankton Tiny plants (phytoplankton) and animals (zooplankton) that float or swim in lakes or in the surface waters of the ocean.

Predator An animal that preys on (hunts and kills) other animals for food.



Temperate Having a mild climate, in between polar and tropical.

Tropical Situated in the tropics, close to the line of the Equator.

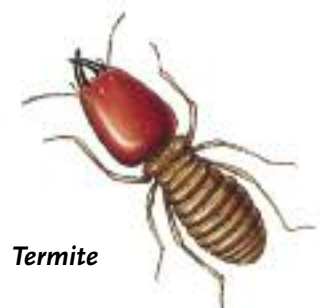
Tides The daily and seasonal changes in levels of the seas and oceans, due to the pull of gravity of the Moon and Sun.

Trench A long, very deep valley in the sea bed.

Tributary A stream or river that feeds a larger one.

Water cycle The process by which water circulates from the oceans or land to the atmosphere and back. Warmed by the Sun, water evaporates and rises into the atmosphere.

As it rises, it cools and condenses, forming clouds. Rain and snow fall to the ground and the water flows into rivers and oceans once again.



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