

My First Library of Knowledge

The Living World



 Orpheus

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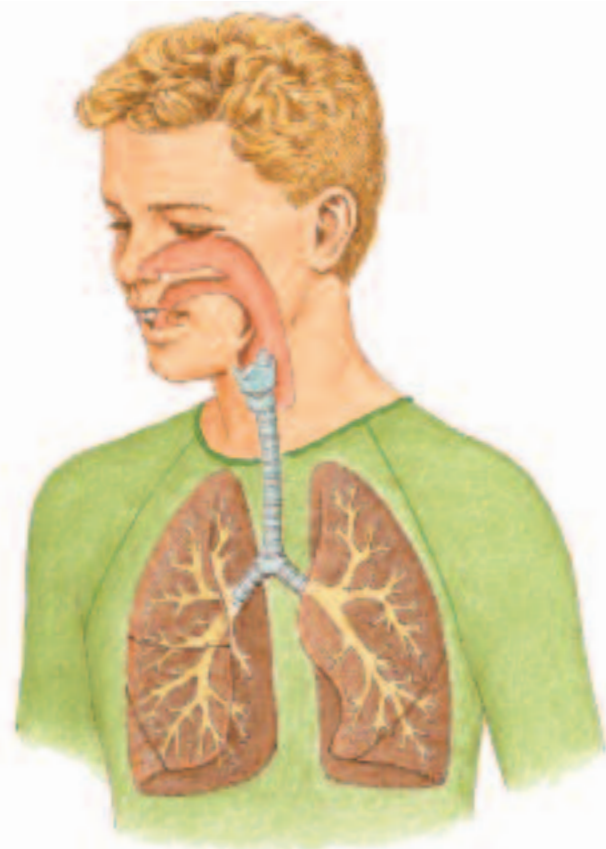
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INTRODUCTION

EVERYWHERE on our planet there is life: in the hottest desert or the coldest wastes, on the highest mountain or in the deepest ocean. You are one of billions of living things on Earth. This book tells you about the amazing variety of life, from microscopic viruses to gigantic trees, and how living things—including human beings—work.

LIFE ON EARTH

PLANTS and animals live in all parts of the world: on land, in the sea, in frozen wastes or in hot jungles. Scientists call the places where they live—for example, woodlands, mountains or marshes—habitats. Large habitats, such as tropical rainforests, deserts or the oceans, are called biomes.

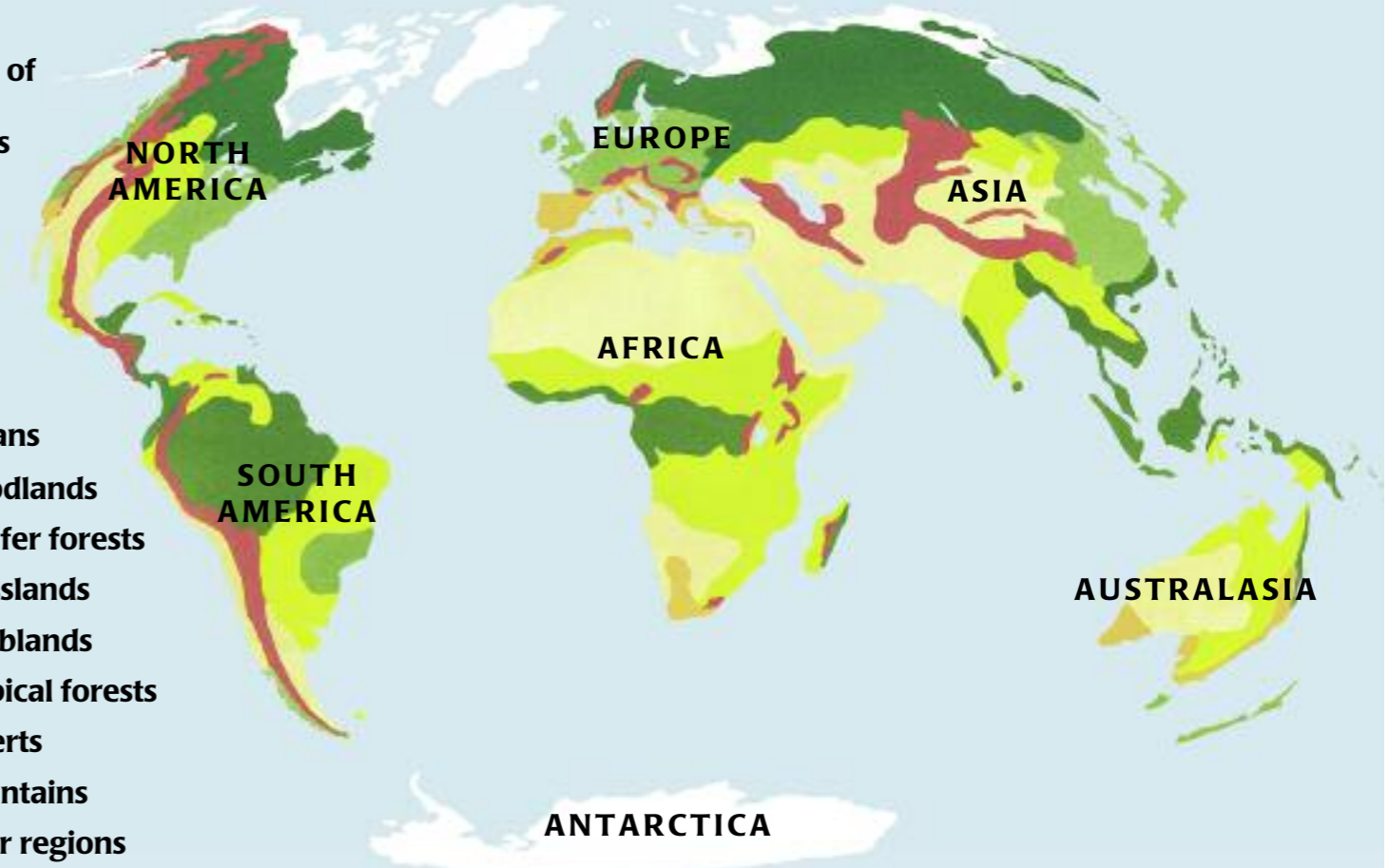


SEASHORE LIFE

A seashore is a good example of a habitat. The animals and plants that make their homes there are used to the changing conditions. Twice daily, at high tide, they are submerged in salty water. At low tide, they are exposed to the open air.

A map of world biomes

- Oceans
- Woodlands
- Conifer forests
- Grasslands
- Scrublands
- Tropical forests
- Deserts
- Mountains
- Polar regions



BIOMES OF THE WORLD

Each biome is a huge area where the climate and conditions are similar. For example, all deserts are dry, while rainforests grow where

the climate is always hot and wet. A biome may contain several different habitats. The woodlands biome, for example, may include oak, maple or beech woods.



THE WORLD OF WILDLIFE

ANIMALS and plants are well suited to life in their own habitats. Monkeys swing through rainforest trees, giraffes use their long necks to eat leaves from high savannah trees, while many desert animals come out to feed only when it is cooler at night.



TROPICAL RAINFORESTS

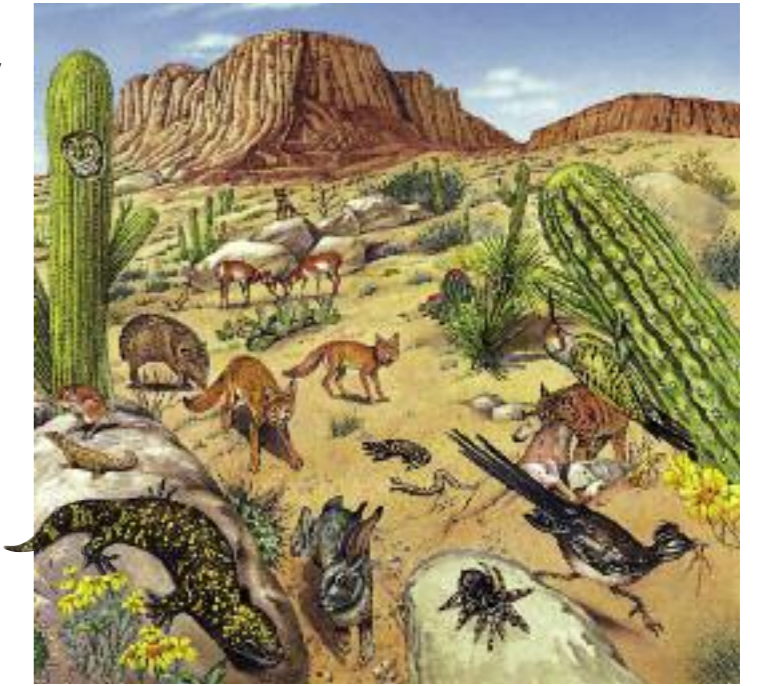
Hot and wet all year, steamy rainforests have more wildlife than anywhere else. Most of the animals, including birds, insects and some mammals, live in the sunlit “canopy” at the treetops. Lower down, less light gets through. Big cats and snakes prey on rodents, lizards and other ground-dwelling animals.

Africa’s hot grasslands are called savannah. There are just two seasons: a dry and rainy season. At the onset of the dry season, the animals migrate to wetter areas.



DESERTS

Some deserts, such as the Sahara in Africa, are scorching hot by day, but chilly at night. Many deserts are sandy or rocky with areas of scrubland. Cacti grow in North American deserts. They have thick stems for storing water.



Woodlands are warm and leafy in summer, but cold and bare in winter. Some animals hibernate: they spend the winter asleep in burrows.

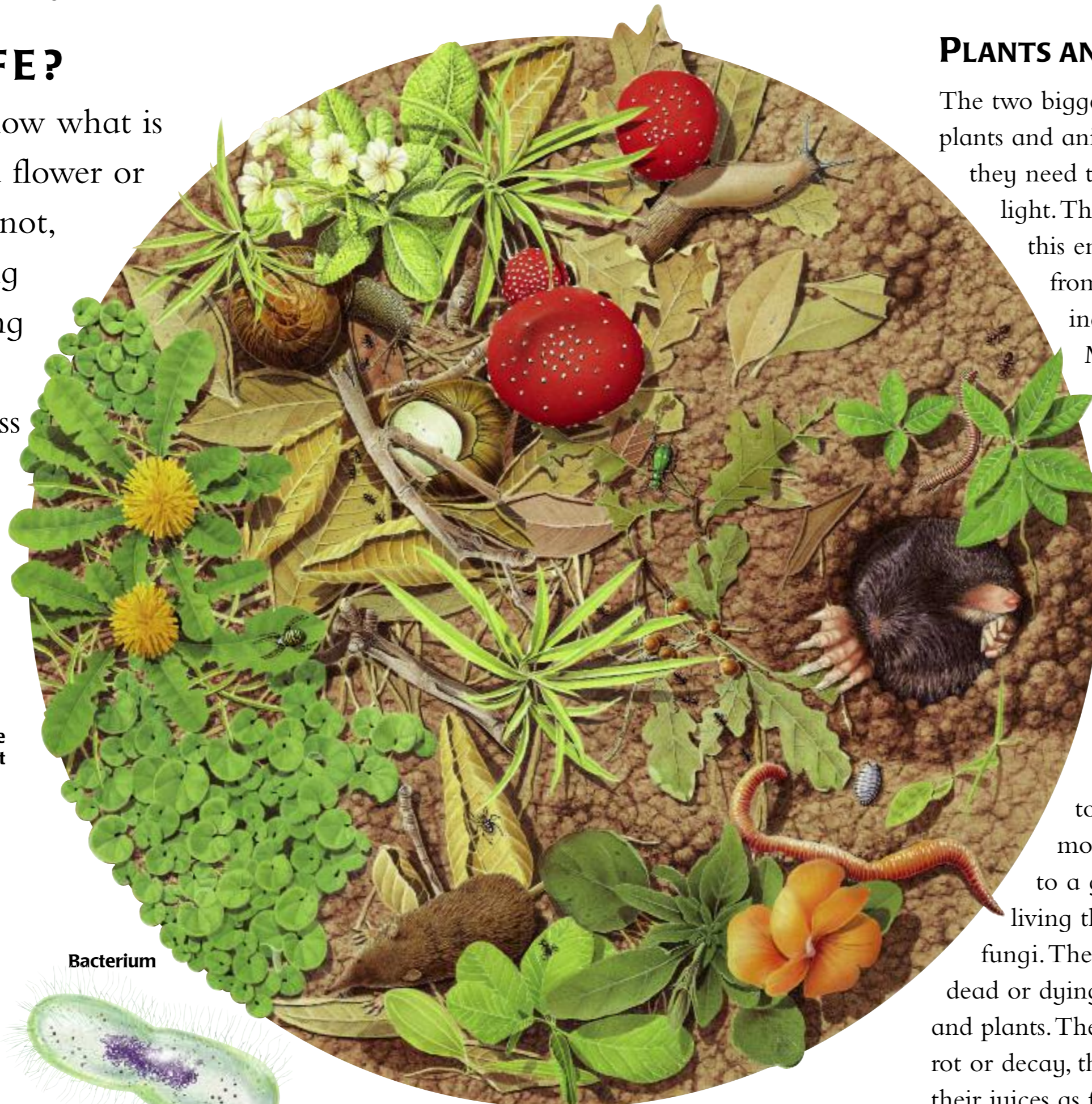
ANTARCTICA

Very little life is found on the freezing continent of Antarctica—a cold desert. Its animals live clustered around the coasts and islands. Antarctic waters are rich in tiny shrimp-like creatures, called krill. These are food for bigger animals, such as whales. Penguins, seal and sea birds such as albatrosses hunt for fish. Antarctic animals and birds have a layer of fat called blubber to keep them warm.



WHAT IS LIFE?

HOW DO we know what is living, such as a flower or a worm, and what is not, such as a stone? Living things grow by making or taking in food of some kind. This process uses energy. Also living things make more of their own kind. This is called reproduction.

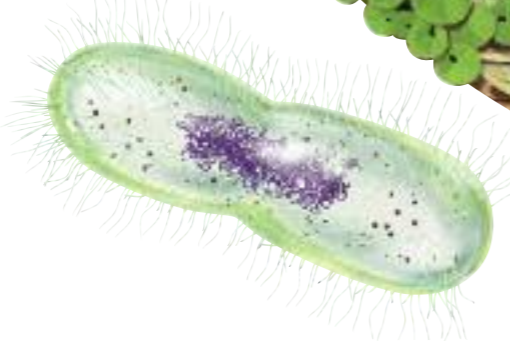


A plant-like protist



The tiniest living things include bacteria. They are made of just one living "unit", called a cell. Protists are slightly bigger, but still have just one cell.

Bacterium



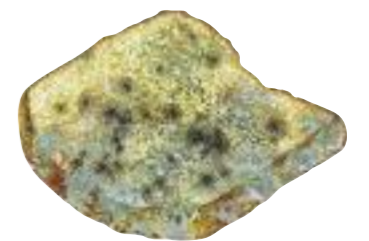
PLANTS AND ANIMALS

The two biggest groups of living things are plants and animals. Plants get the energy they need to live and grow from the sun's light. They make their own food using this energy. Animals get their energy from the food they eat, which may include plants or other animals. Most animals can move about, while most plants stay in the same place.

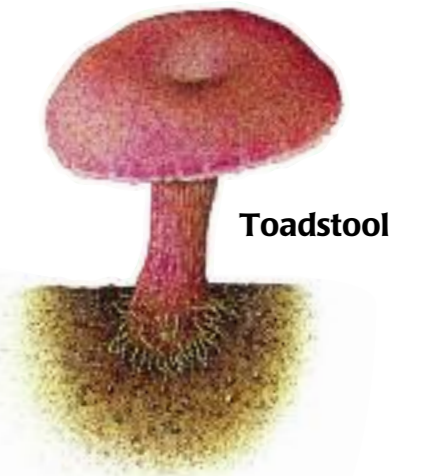
A small area of soil may be teeming with life. In this illustration, you can see a mole, a vole, a snail, a slug, a woodlouse, an earthworm, a millipede, spiders, insects, plants and fungi.

FUNGI

Mushrooms, toadstools and moulds belong to a group of living things called fungi. They feed on dead or dying animals and plants. They help them rot or decay, then soak their juices as food.



Mould on bread



Toadstool

Some bacteria have frilly edges and long tails, which they wave to swim along.

MICRO-LIFE

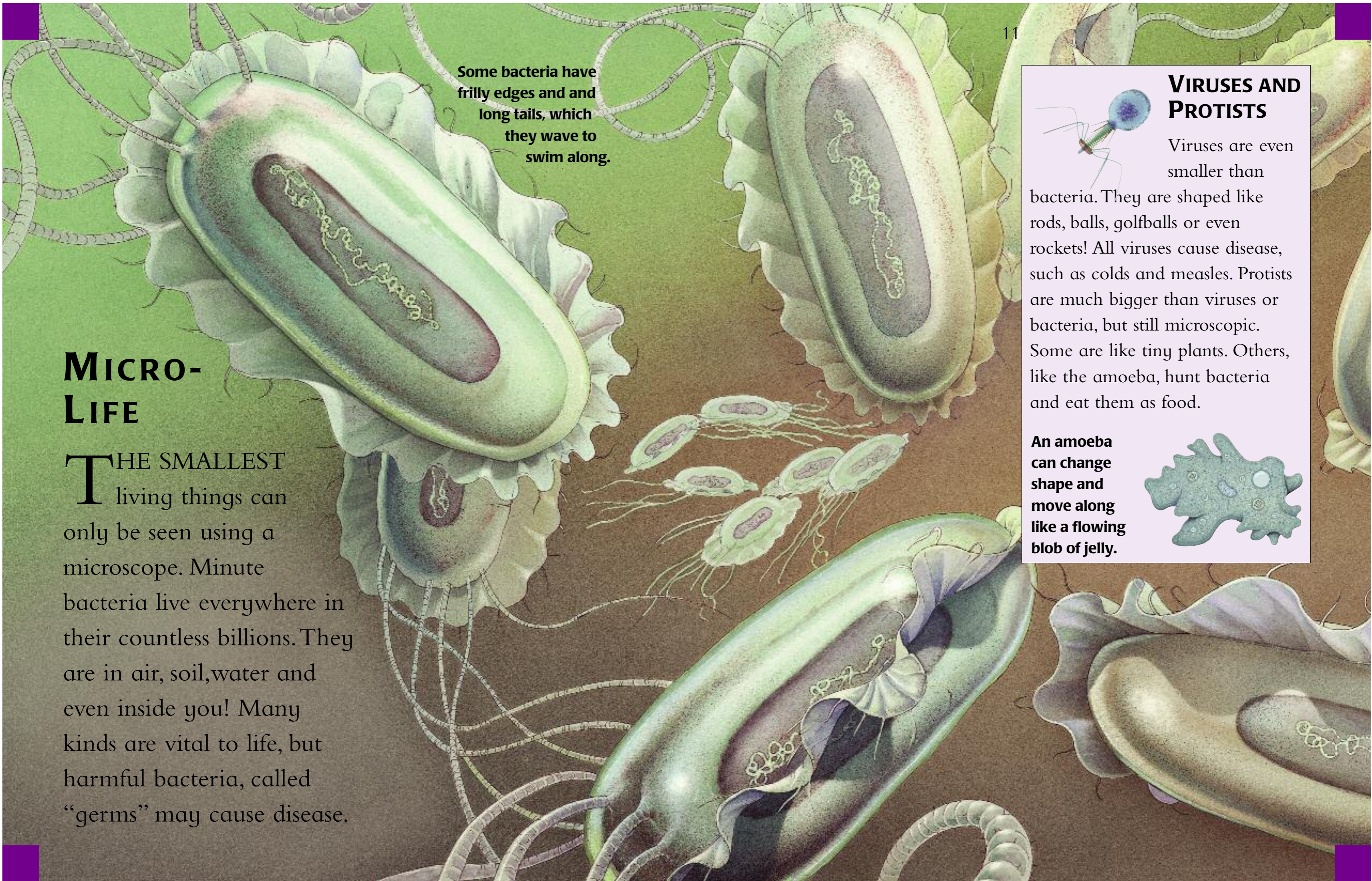
THE SMALLEST living things can only be seen using a microscope. Minute bacteria live everywhere in their countless billions. They are in air, soil, water and even inside you! Many kinds are vital to life, but harmful bacteria, called “germs” may cause disease.

VIRUSES AND PROTISTS



Viruses are even smaller than bacteria. They are shaped like rods, balls, golfballs or even rockets! All viruses cause disease, such as colds and measles. Protists are much bigger than viruses or bacteria, but still microscopic. Some are like tiny plants. Others, like the amoeba, hunt bacteria and eat them as food.

An amoeba can change shape and move along like a flowing blob of jelly.

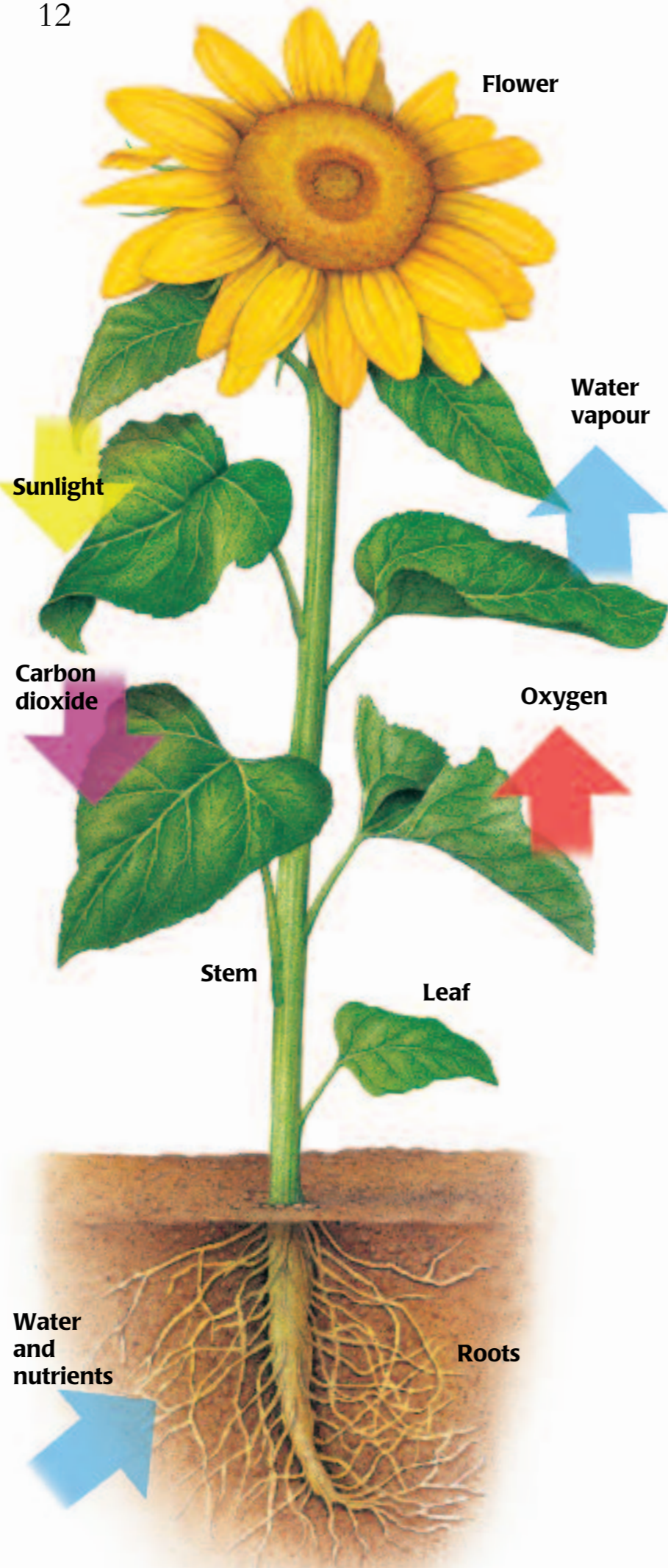


PLANTS

PLANTS take in energy not from food but from sunlight. They use this energy to make the food that a plant needs to grow. This process is called photosynthesis.

MAKING FOOD

A plant uses its green leaves to receive sunlight. The leaves also take in carbon dioxide from the air, while water (and vital nutrients) are soaked up from the soil through the roots. The sunlight energy joins the water and carbon dioxide together to make a sugar called glucose. As this happens, waste oxygen and water vapour passes into the air.



TYPES OF PLANTS

Not all plants have colourful flowers, broad leaves, tall stems and spreading roots. Neither liverworts nor mosses have roots. They soak up water and minerals through their whole body. The branching “leaves” of a fern are known as fronds. None of these plants has flowers.



Liverwort



Fern



Moss

Liverworts, ferns and mosses grow mainly in damp, shady places. They are common in woods and along the banks of streams.



VENUS FLY-TRAP

Some plants get vital nutrients by catching animals. The spiny-edged leaf of a Venus fly-trap (above) snaps shut whenever a small insect lands on it. The spines interlock to trap the struggling insect.



PITCHER PLANT

Like the Venus fly-trap, the pitcher plant (left) grows in nutrient-poor soil. Insects attracted to the plant’s nectar fall into bottle-shaped pitchers filled with rainwater and the plant’s digestive juices, where they drown. The plant soaks up nutrients from the dead and digested insects.

TREES

A TREE is a tall plant with a stiff, woody trunk. The trunk is covered by bark and has branches growing out from it. There are two main kinds of tree: broadleaf trees and conifers.



Cone scales open in dry weather to release seeds



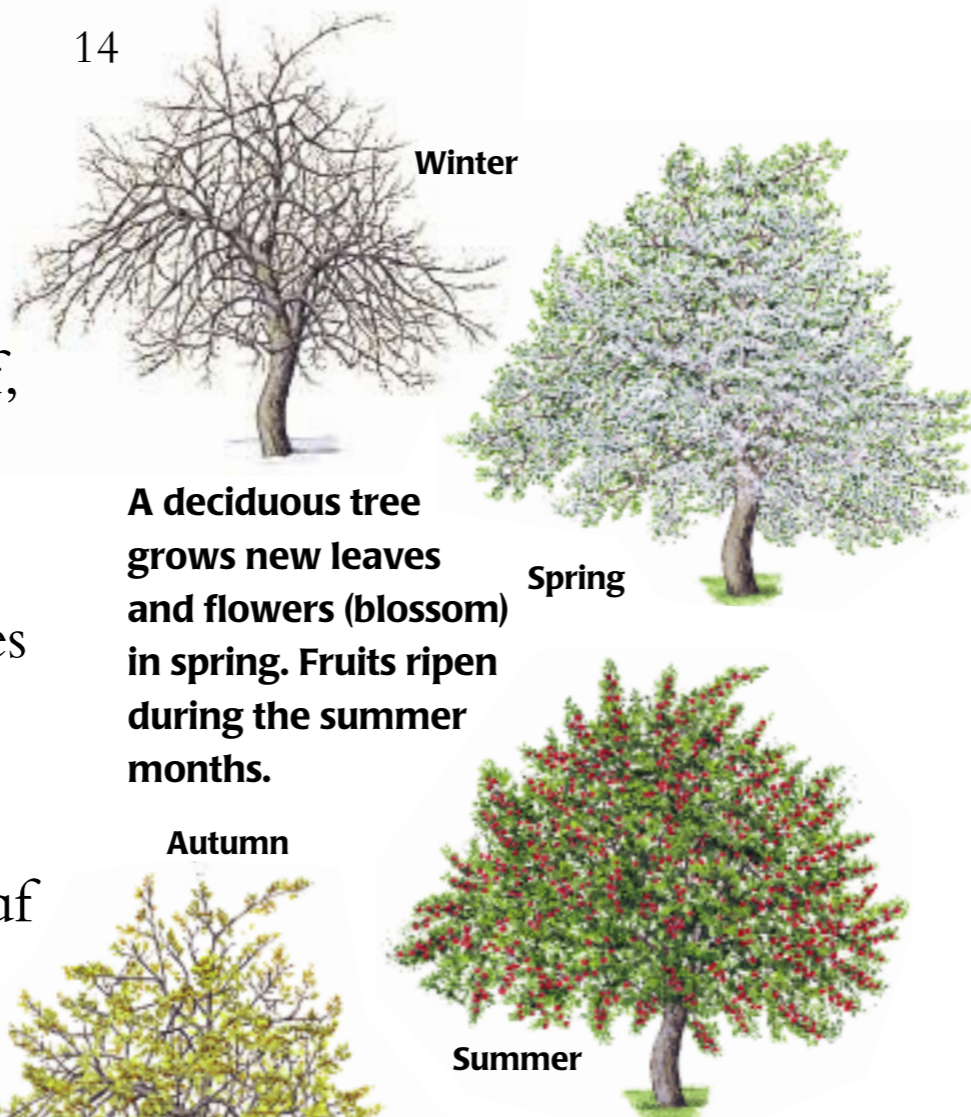
Scales close in damp weather



Most conifers are evergreen: they keep their needle-like leaves (above) all year round. Their seeds grow in woody cones.



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A deciduous tree grows new leaves and flowers (blossom) in spring. Fruits ripen during the summer months.

A TREE'S YEAR

Most broadleaf trees are deciduous: they lose their leaves when it becomes colder in autumn. The leaves change colour to yellows, reds and browns as nutrients seep back into the tree. Then they die and fall off. As the weather turns warm next spring, new leaves grow from small buds.

ROOTS AND SHOOTS

A tree has roots below ground and a shoot, made up of a trunk, branches and twigs, above ground. The twigs spread out the leaves so that they all receive sunlight. The centre of the trunk is the heartwood. It forms the tree's strong "backbone". Around the heartwood lies the sapwood, which carries water and nutrients from the roots up to the leaves. A new layer of sapwood grows each year. There is more growth in warm, wet years than in cold, dry ones.



Bark

Sapwood (with annual rings)

Heartwood

The annual layers of sapwood appear as rings. You can tell how old a cut-down tree was by counting the rings on its stump.

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PALM TREES

Palm trees have a straight trunk without branches.

At the top is a crown of large leaves. Coconut palms grow along tropical seashores. Their seeds ripen into coconuts. These may fall into the sea and float to other beaches where they grow into more coconut palm trees.



Beech Different trees have leaves of different shapes. Some grow singly, each with a stalk. Others have joined stalks.



Horse chestnut

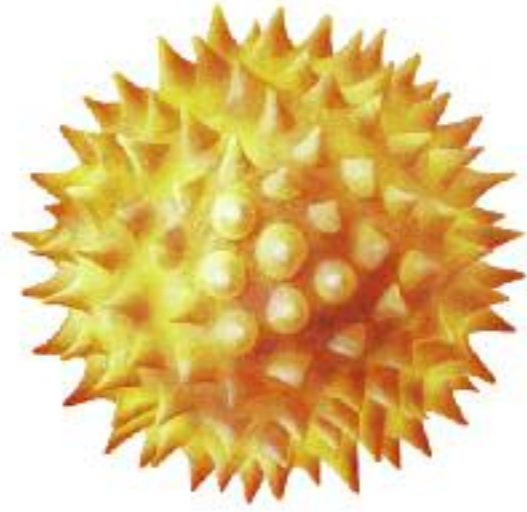


FLOWERS AND SEEDS

FLOWERS have male and female parts—sometimes on different flowers—which make seeds. The male parts, or stamens, make tiny dust-like grains of pollen. They must get to the female parts, or carpels, of a flower of the same kind. This is called pollination.

POLLINATION

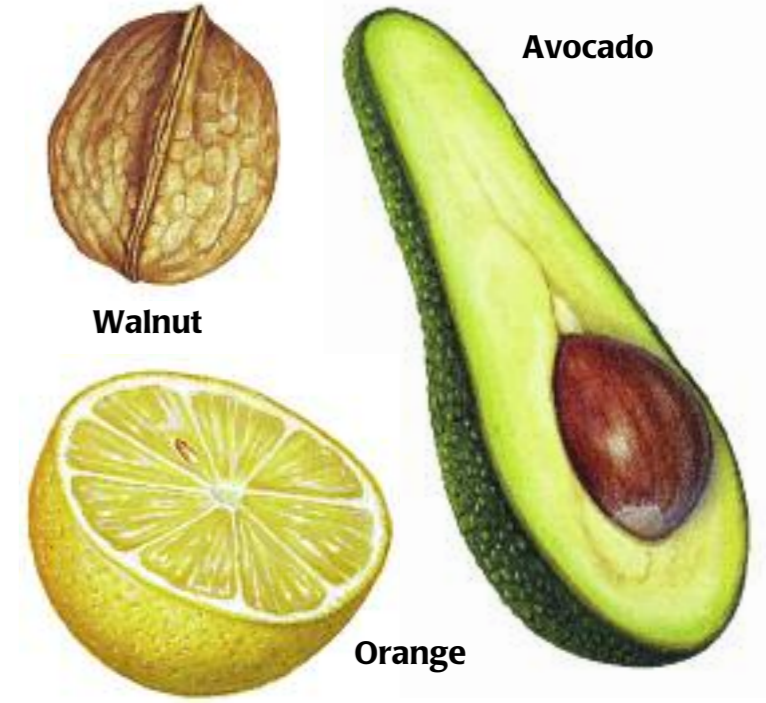
Colourful, scented flowers attract insects to their sweet nectar. Pollen brushes on to the insect which it then carries to another flower's female parts. Dangling catkins use the wind to spread pollen.



Some pollen grains have spikes or hooks to grip on to an animal's body. Pollen grains carried by the wind look like tiny balloons or parachutes.

SEEDS

After the pollen arrives, the female parts of a flower can make their seeds. Some seeds are in tasty fruits, like pips in an orange, a nut's kernel, peas in a pod or an avocado's "stone". The tasty fruits attract animals. They eat the soft parts and discard the seed—or pass it out of their bodies in their faeces. Other seeds are scattered or dropped by animals.



Walnut

Avocado

Orange



Dandelion

Peas

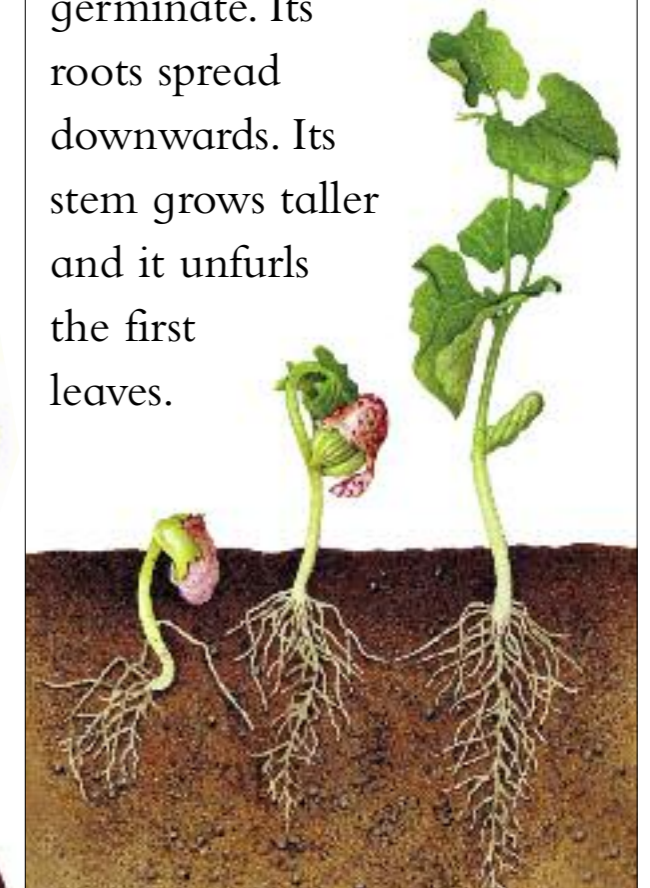
Sycamore

Some seeds are spread by the wind. They include the dandelion's fluffy "parachutes" and the twirling wings of the sycamore seed. Other seeds may be carried by animals.



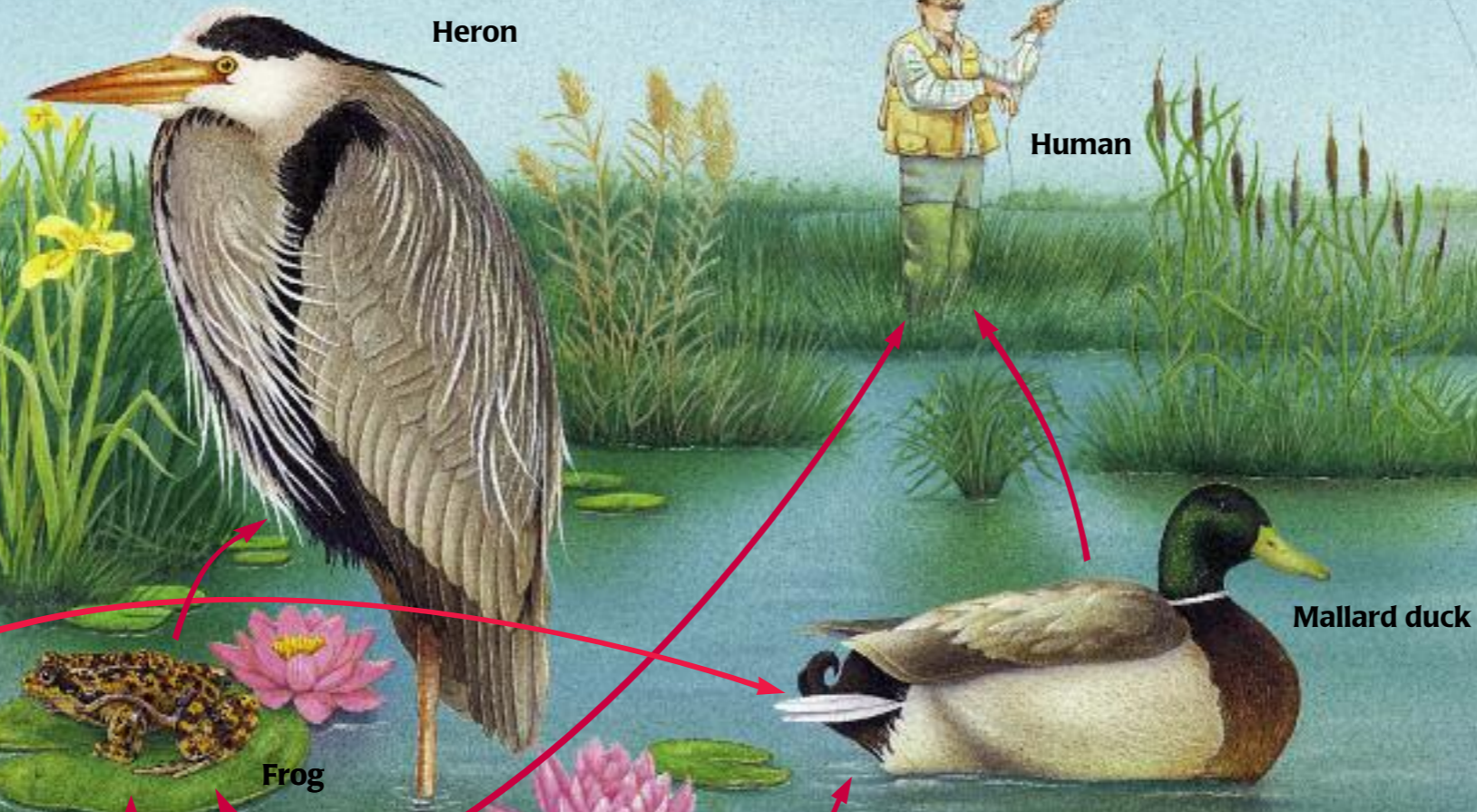
GROWING

A seed that reaches warm damp soil begins to grow or germinate. Its roots spread downwards. Its stem grows taller and it unfurls the first leaves.



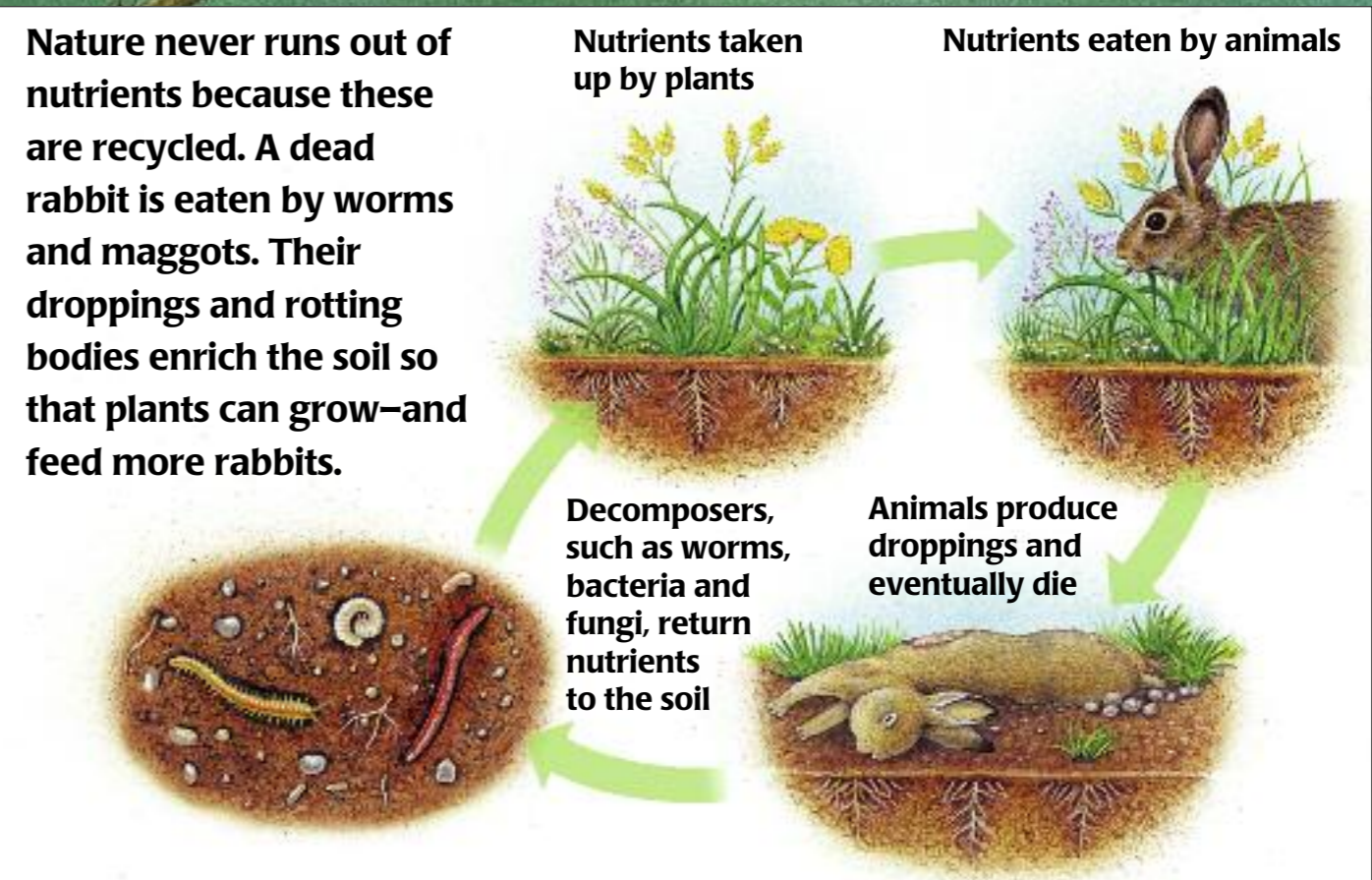
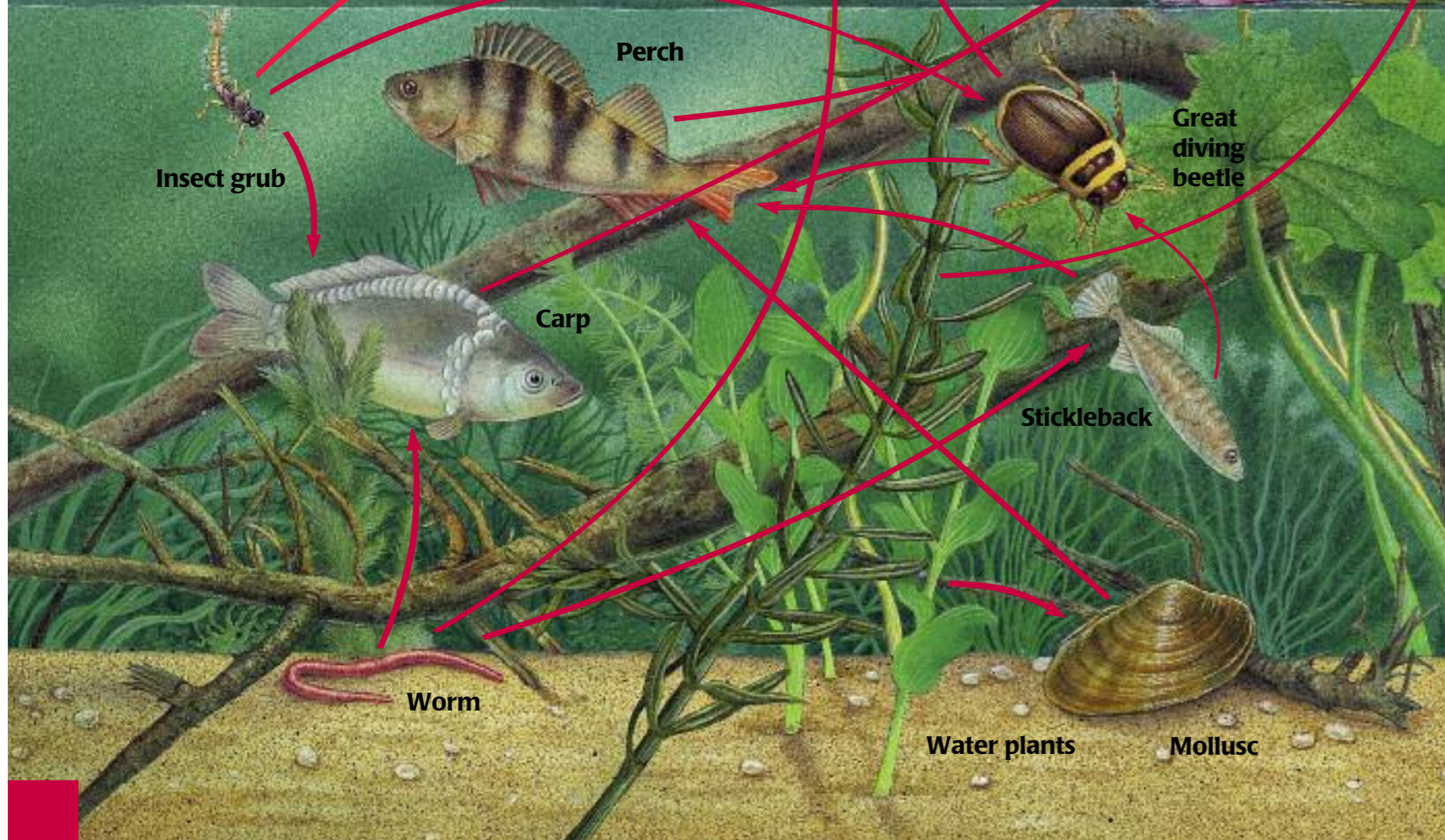
FOOD WEBS

ANIMALS eat plants or other animals. Herbivores eat plants. 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.



POND FOOD WEB

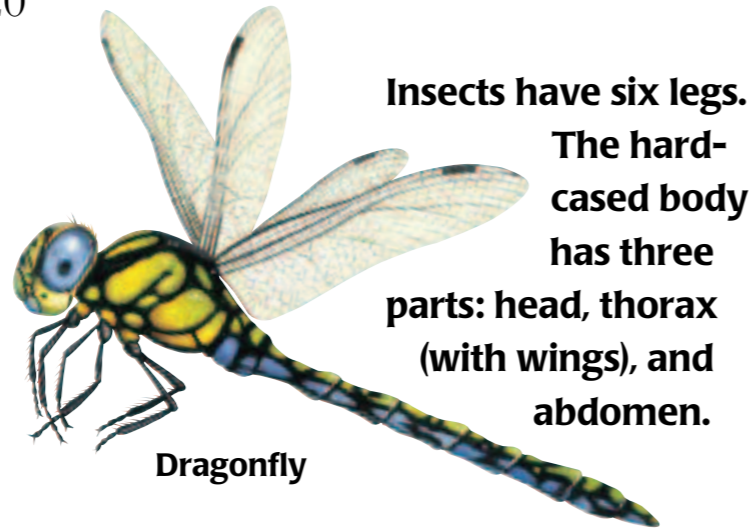
The animals and plants that live together in a pond are linked by a food web. Pond plants are eaten by herbivores, from tiny worms and grubs to ducks. Small carnivores like sticklebacks and diving beetles eat the grubs and worms. Larger carnivores such as perch eat the smaller ones. The heron hunts a number of herbivores and carnivores.



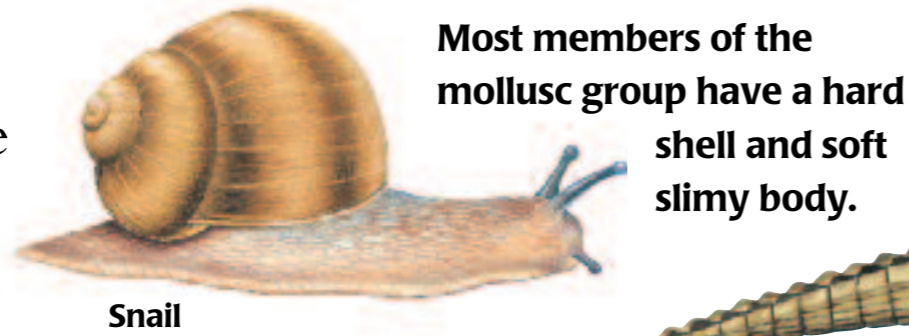
THE ANIMAL KINGDOM

SOME animals are stouter than this full stop. Others are bigger than houses.

Scientists divide the world of animals into about 20 main groups, depending on their body features such as legs, scales or wings.

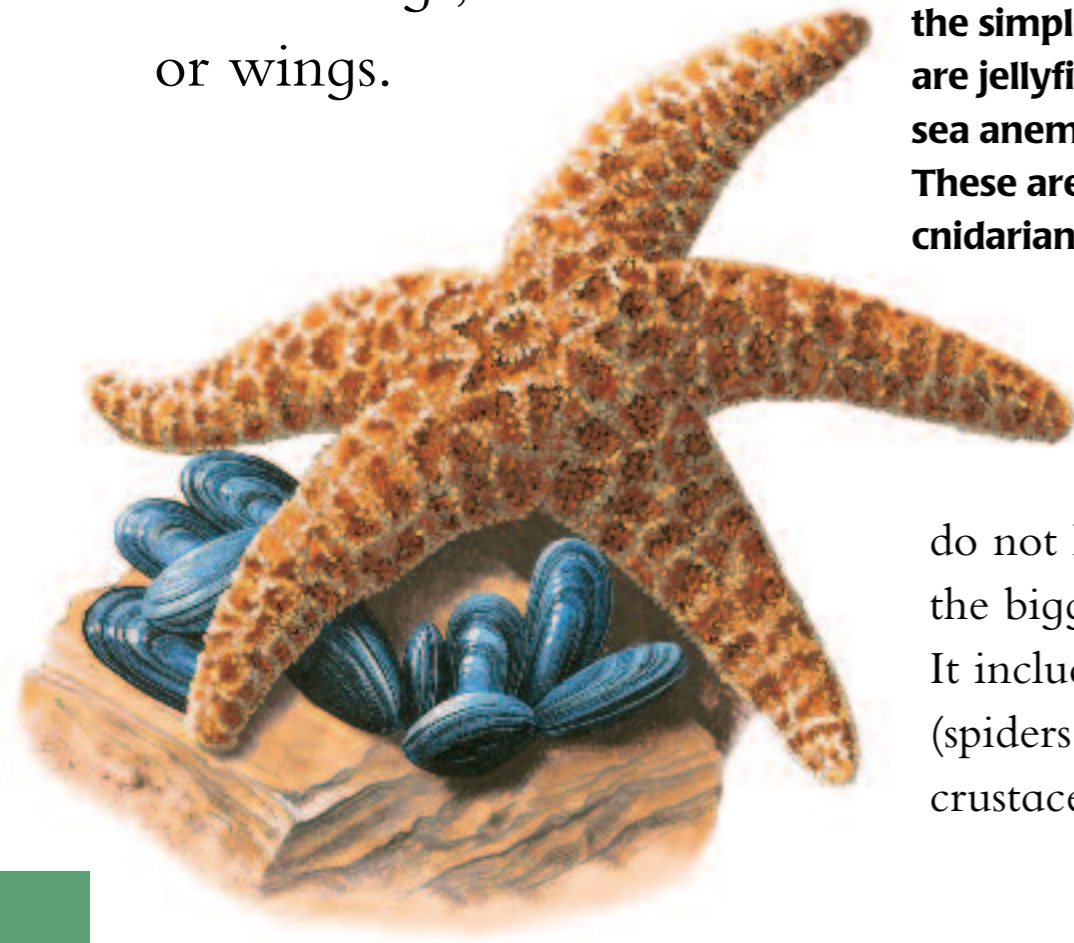


Insects have six legs. The hard-cased body has three parts: head, thorax (with wings), and abdomen.



Most members of the mollusc group have a hard shell and soft slimy body.

Echinoderms such as starfish and sea urchins have spiky or spiny skin. Among the simplest animals are jellyfish and sea anemones. These are called cnidarians.

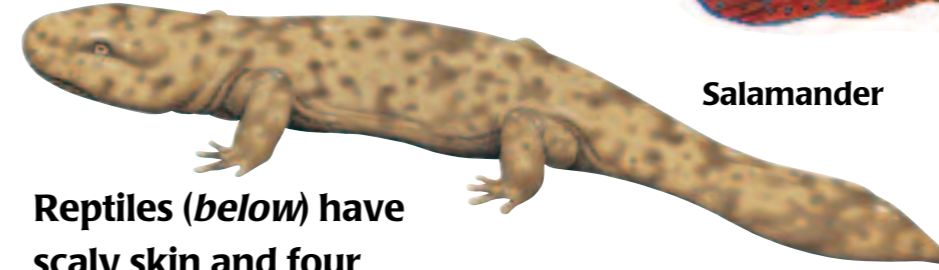
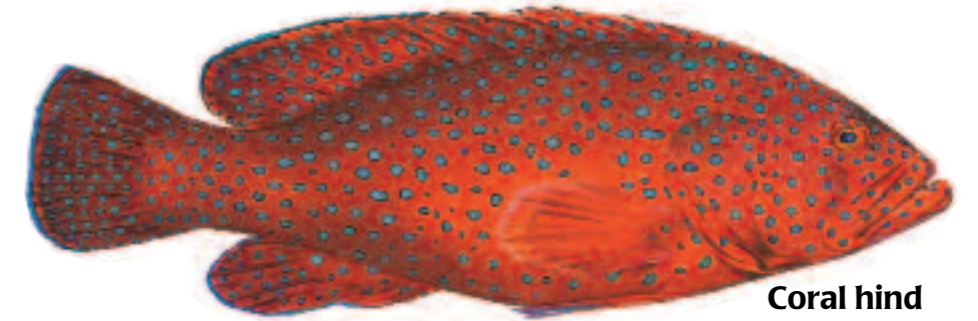


INVERTEBRATES

Invertebrate animals do not have a backbone. By far the biggest group is arthropods. It includes insects, arachnids (spiders and scorpions), and crustaceans (crabs and shrimps).

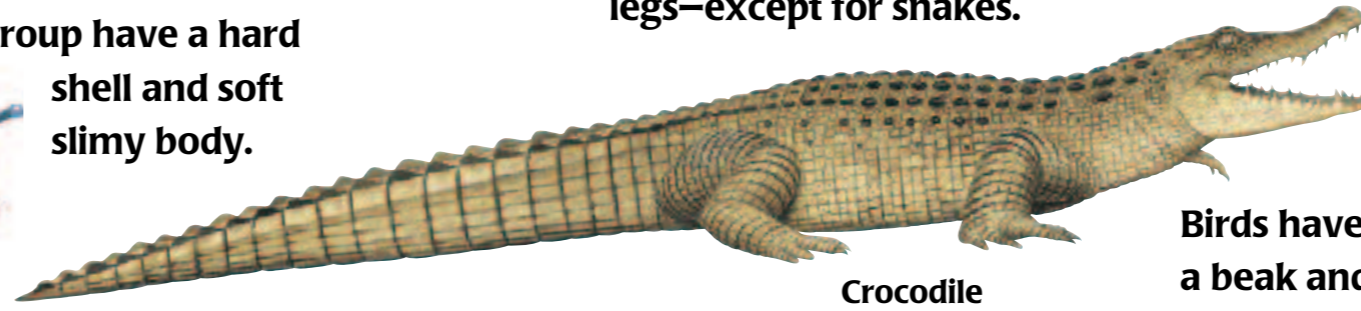


Fish usually have scaly skin, fins for swimming, and gills for breathing under the water.



Reptiles (below) have scaly skin and four legs—except for snakes.

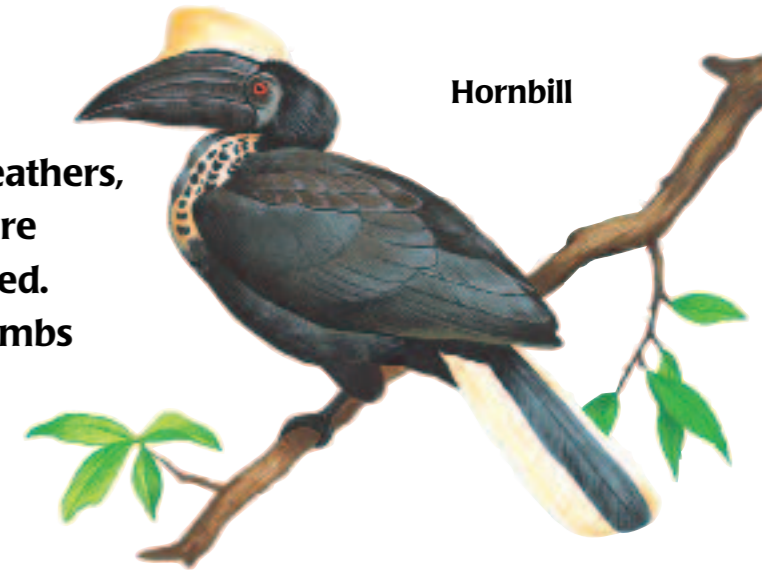
Amphibians (left) have damp skin. They hatch from spawn (eggs) into young called tadpoles. These gradually grow legs.



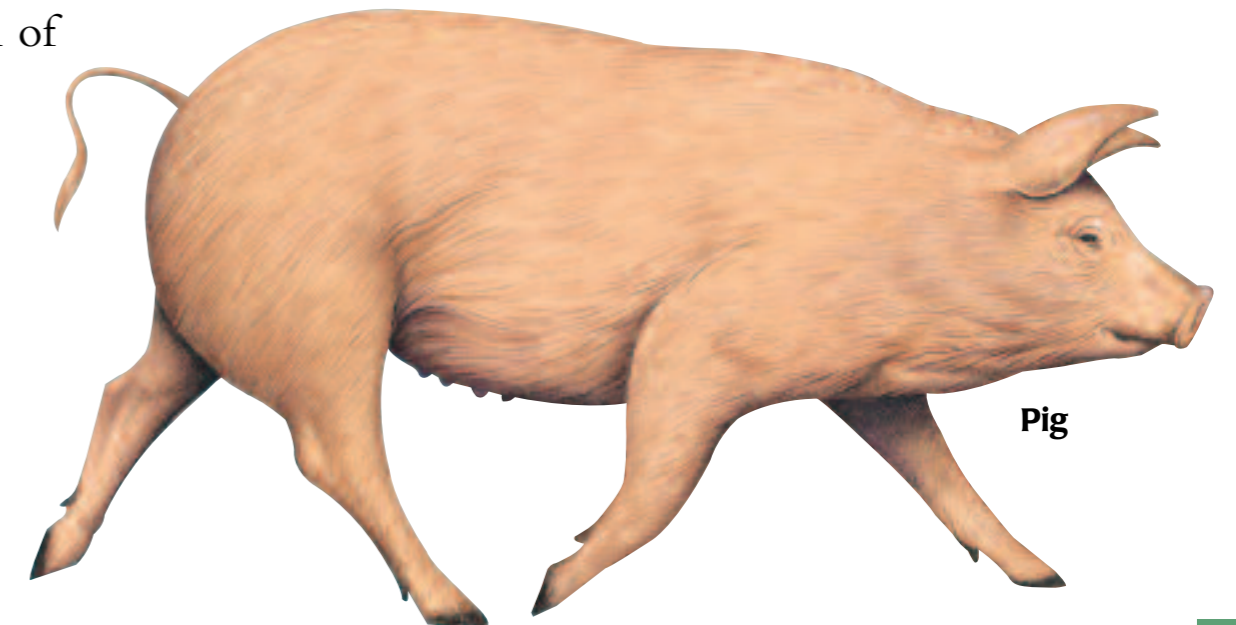
VERTEBRATES

There are five main groups of vertebrates: fish, amphibians, reptiles, birds and mammals. Each has a vertebral column, usually called a backbone. It is part of the inner skeleton of bones. Vertebrates mostly have bigger and more complicated bodies than invertebrates.

Birds have feathers, a beak and are warm-blooded. Their front limbs are wings.

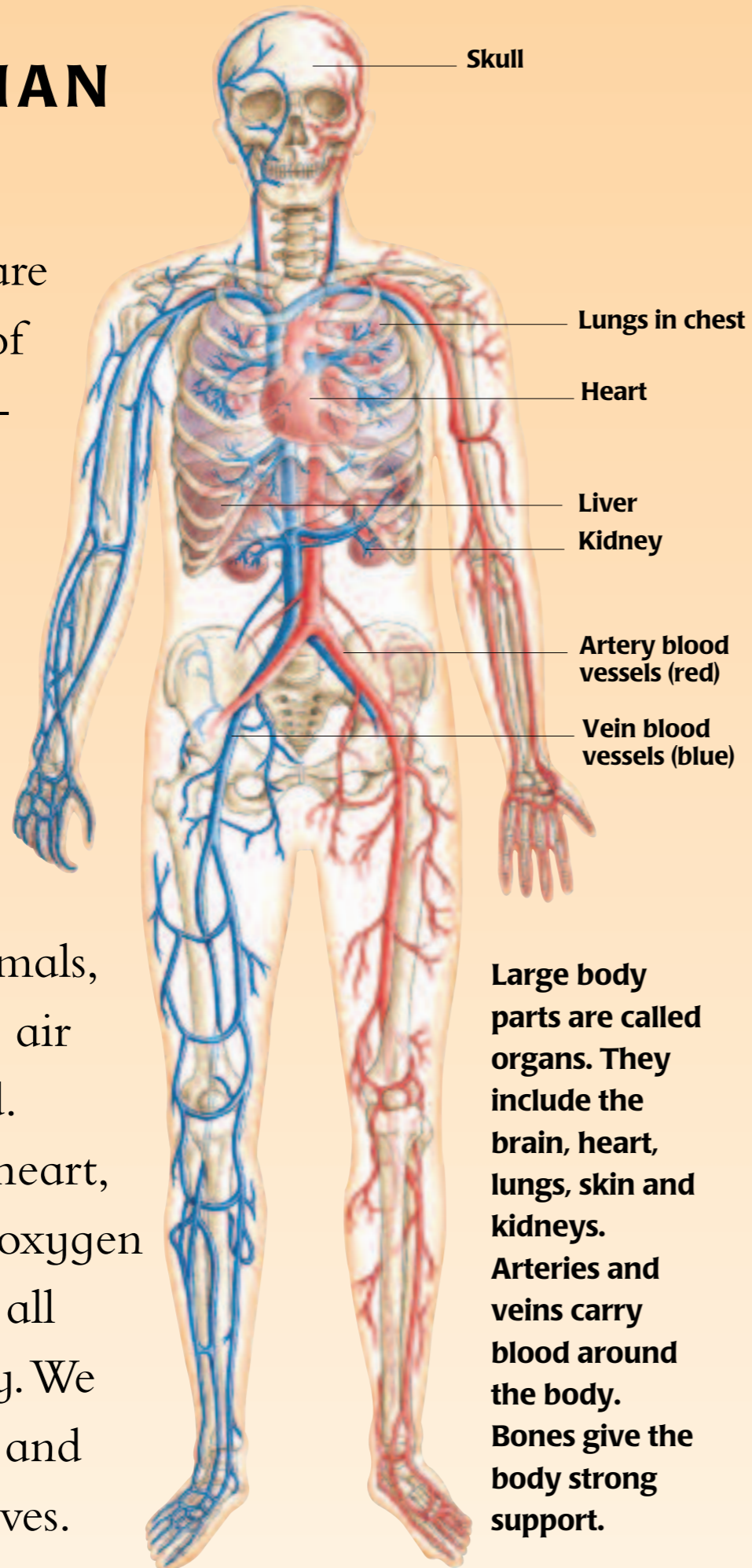


Mammals are warm-blooded, have fur or hair, and feed their babies on mother's milk.



THE HUMAN BODY

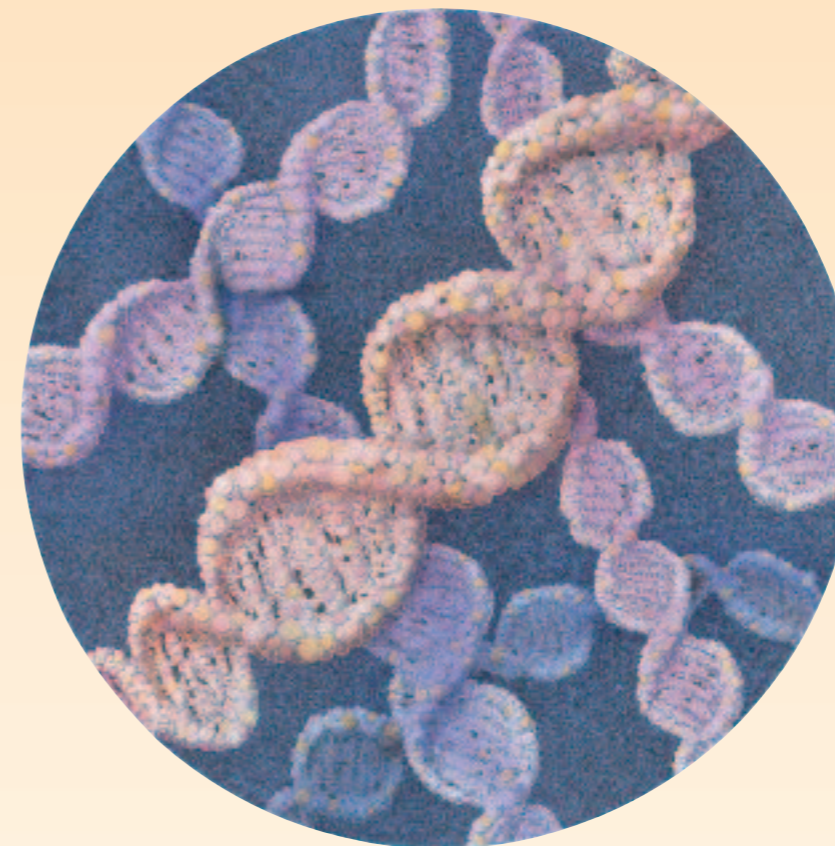
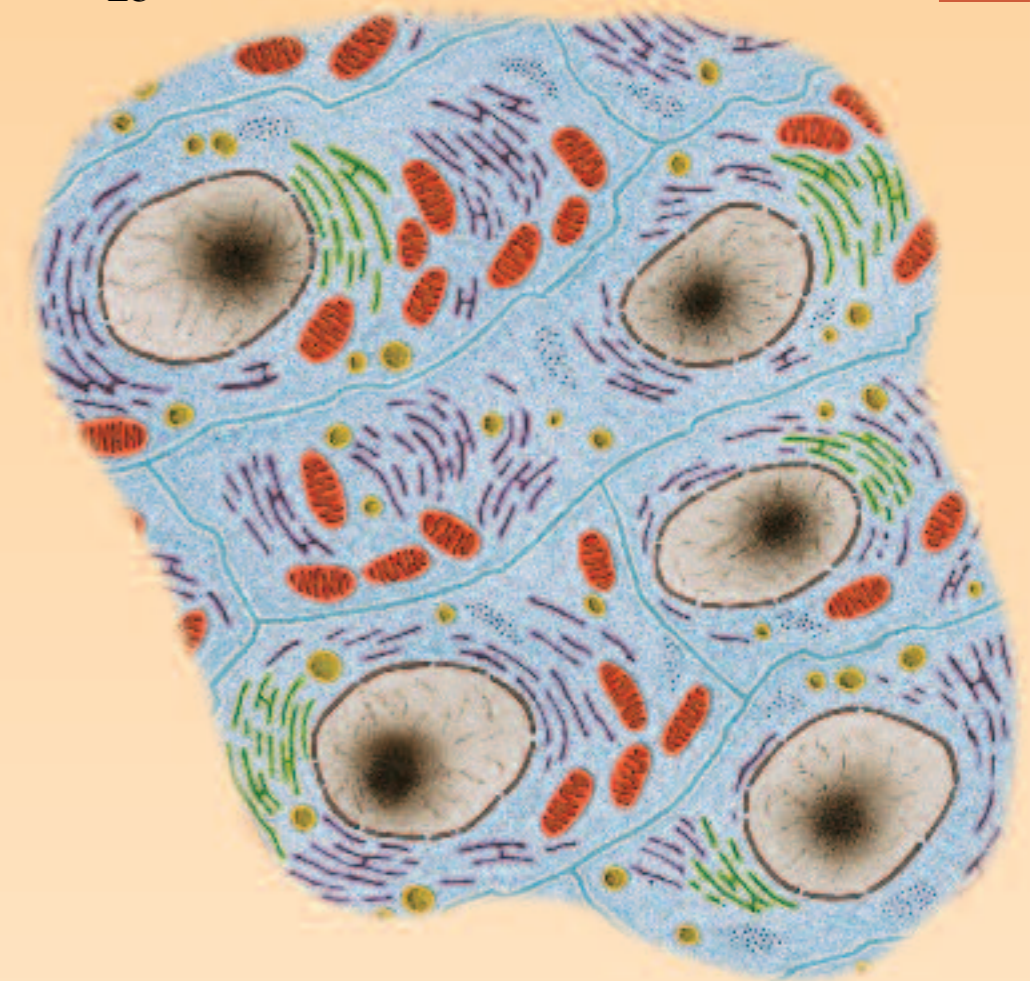
HUMANS are members of the animal kingdom. Together with monkeys and apes, we belong to the group of mammals called primates. Like other mammals, we must breathe air and take in food. Pumped by the heart, our blood takes oxygen and nutrients to all parts of the body. We can move, think and reproduce ourselves.



Large body parts are called organs. They include the brain, heart, lungs, skin and kidneys. Arteries and veins carry blood around the body. Bones give the body strong support.

CELLS

Every living thing is made up of tiny “building blocks” called cells. There are up to 100 million million cells in the human body. There are many different types and shapes. This illustration (*right*) shows what some typical cells look like under a very powerful microscope. The dark centre of each cell is called the nucleus.

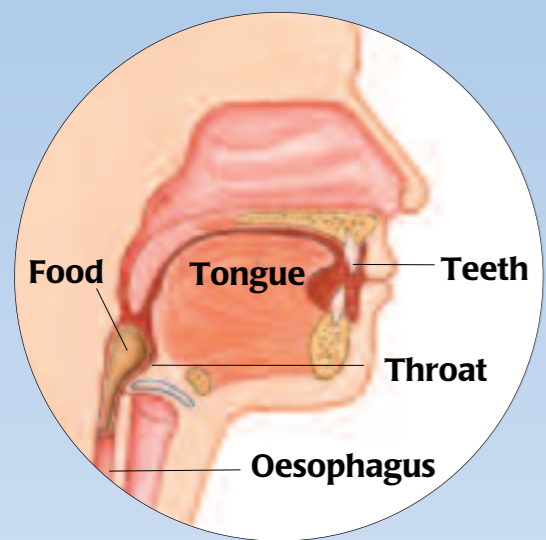


DNA

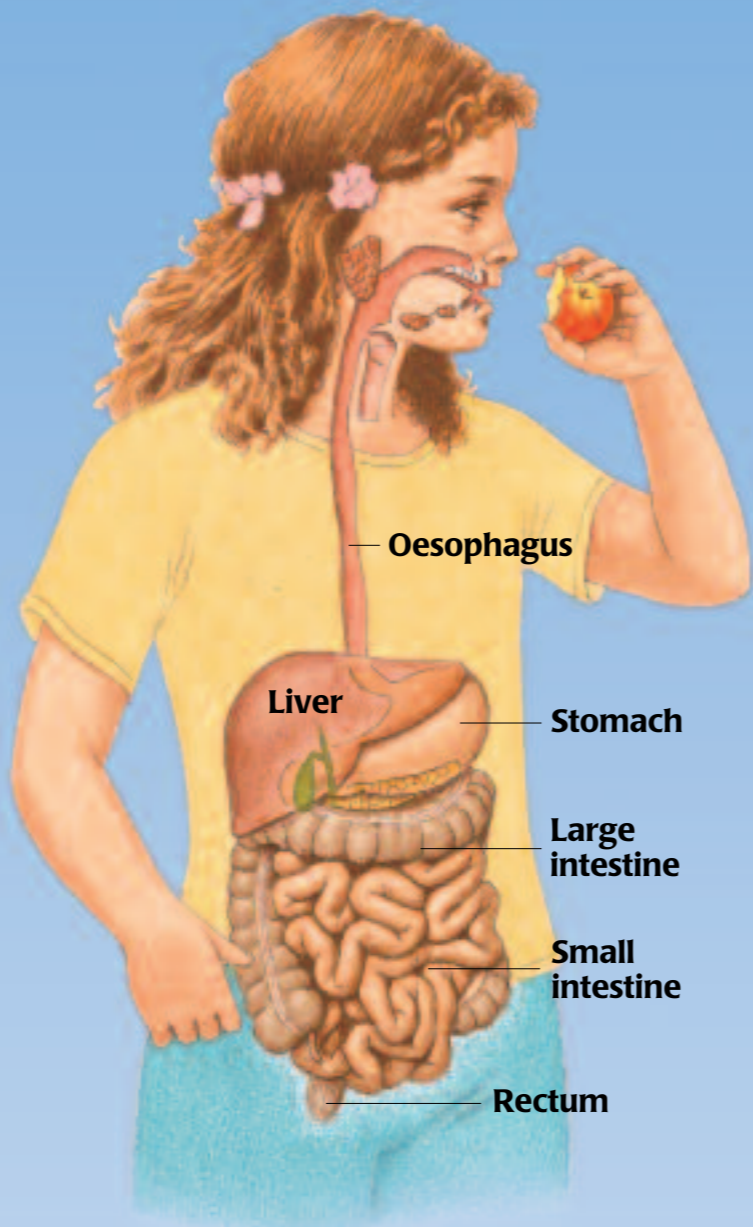
Coiled up inside the nucleus of each of your body’s cells are long strands of a substance called DNA. Seen under a powerful microscope, they look like twisted ladders. The “rungs” of the ladder are made of millions of chemical units. The order of the units down each ladder is like a code. It contains all the information, known as genes, that your body needs to grow, develop and work well.

DIGESTION

FOOD gives the body energy to stay alive and move about. The nutrients in food help us grow and stay healthy. Digestion means breaking food into smaller and smaller pieces, so they can be used by your body.



Digestion starts as you chew food until it is slippery and soft. Your tongue pushes a lump into your throat. The muscles in the wall of the oesophagus force it down to the stomach.

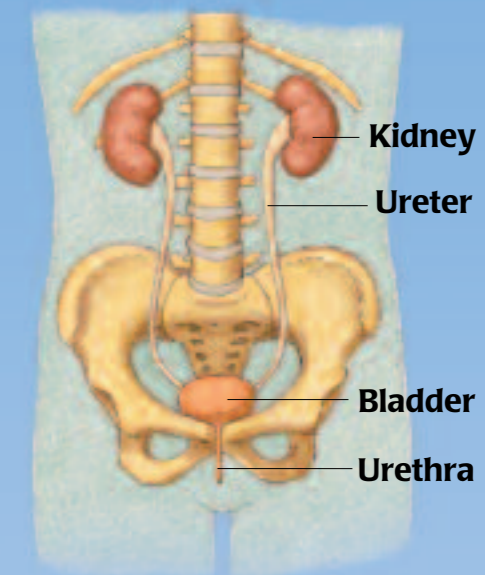


THE DIGESTIVE SYSTEM

You swallow chewed food into your oesophagus, and from there down to the stomach. Here the food is mashed up in powerful chemicals. The soup-like food oozes into the small intestine. This takes in nutrients and passes them to the liver. The large intestine absorbs water from the leftovers. The waste is then stored in the rectum.

KIDNEYS

Your body makes many waste substances. These are collected up by the blood, which flows through the kidneys. Each kidney contains one million tiny filters. They take the wastes from the blood and form a liquid called urine. This trickles down the ureter tube to the bladder. From here, urine passes along the urethra tube to the outside.



NUTRIENTS

Your foods should contain six kinds of nutrients. Proteins are “building foods” for growth and repair. Carbohydrates are “energy

foods”. Fats and oils also contain energy. Fibre helps your digestion to stay healthy. Vitamins and minerals keep your body working well and able to fight disease.



Proteins are in meats, fish, dairy food and vegetables.



Fibre is in grains, fruits, vegetables.



Fats and oils come from both animal and plant foods.



Mineral iron is for healthy blood.



Carbohydrates are in starchy and sugary foods.

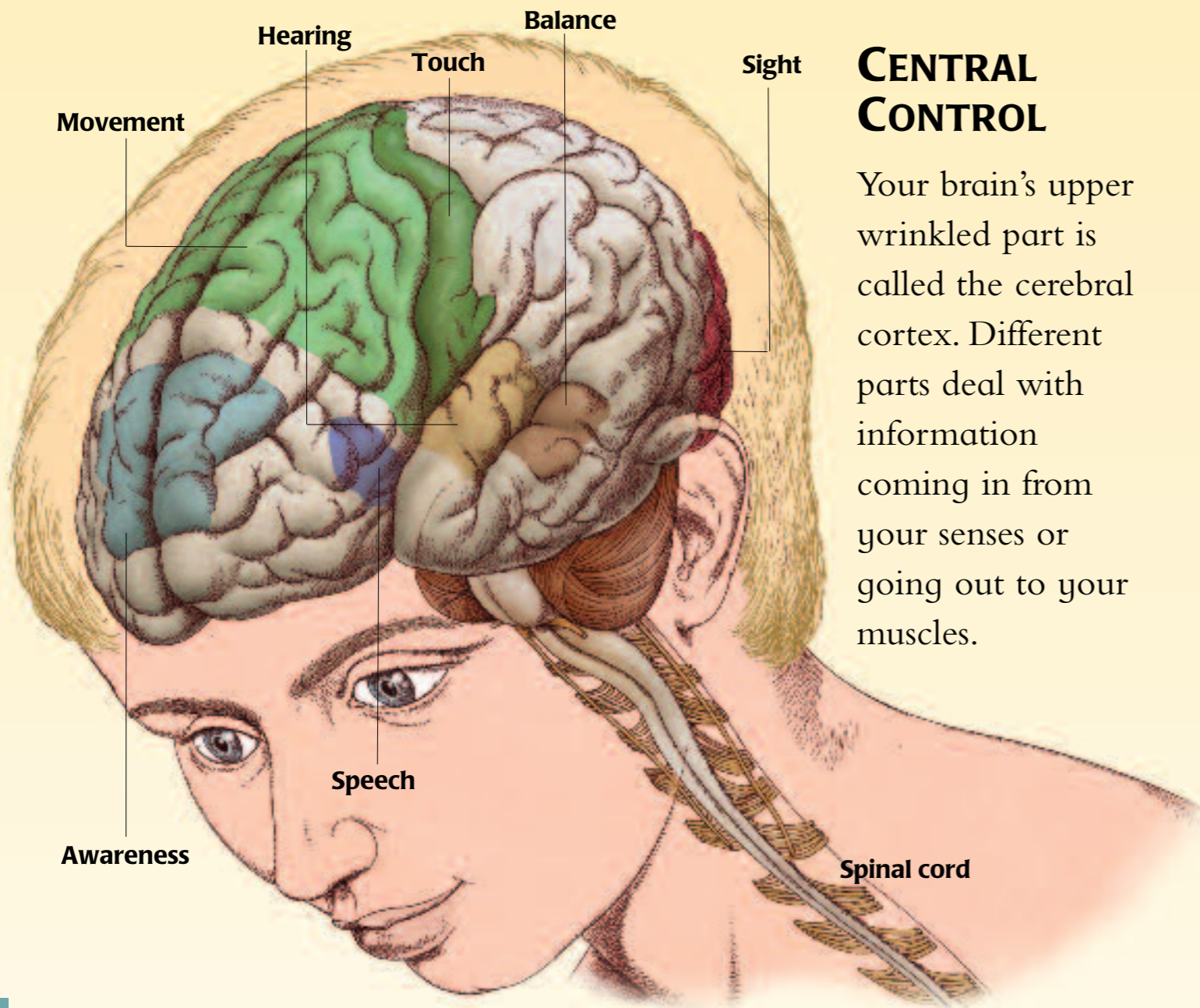


Vitamin A is for good sight and skin.

BRAIN AND SENSES

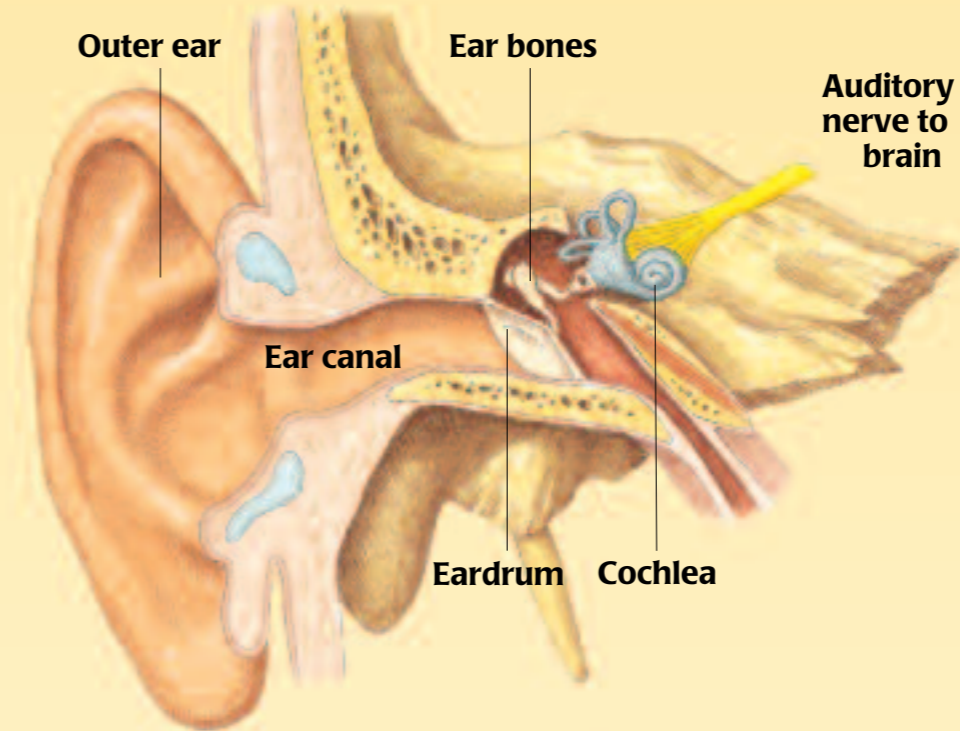
THE BRAIN is the body's control centre. It is in charge of how your heart beats or your lungs breathe. It controls your muscles. It also

enables you to think, learn and feel sadness or joy. The brain sends and receives signals along hair-like nerves linked to all parts of the body.



CENTRAL CONTROL

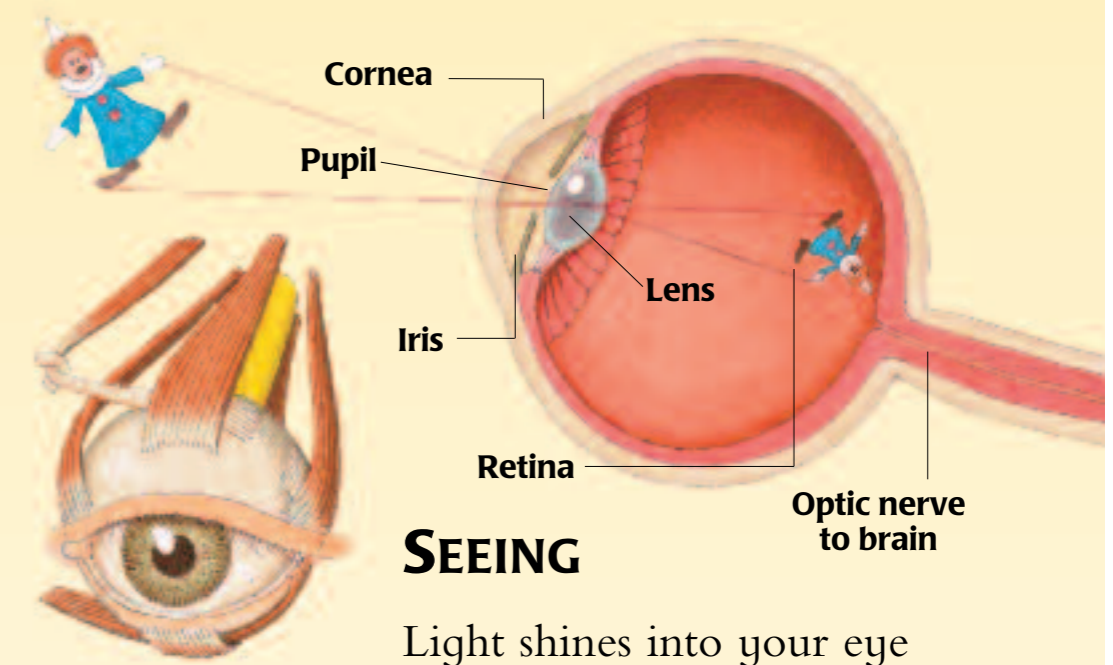
Your brain's upper wrinkled part is called the cerebral cortex. Different parts deal with information coming in from your senses or going out to your muscles.



HEARING

Sound waves pass along the ear canal and strike the eardrum. This sends shivering movements, or vibrations, along three tiny bones to the coiled cochlea. The cochlea turns these vibrations into nerve signals for the brain.

Most of your nerves are linked to the spinal cord, a thick bundle of nerves that runs down your back.

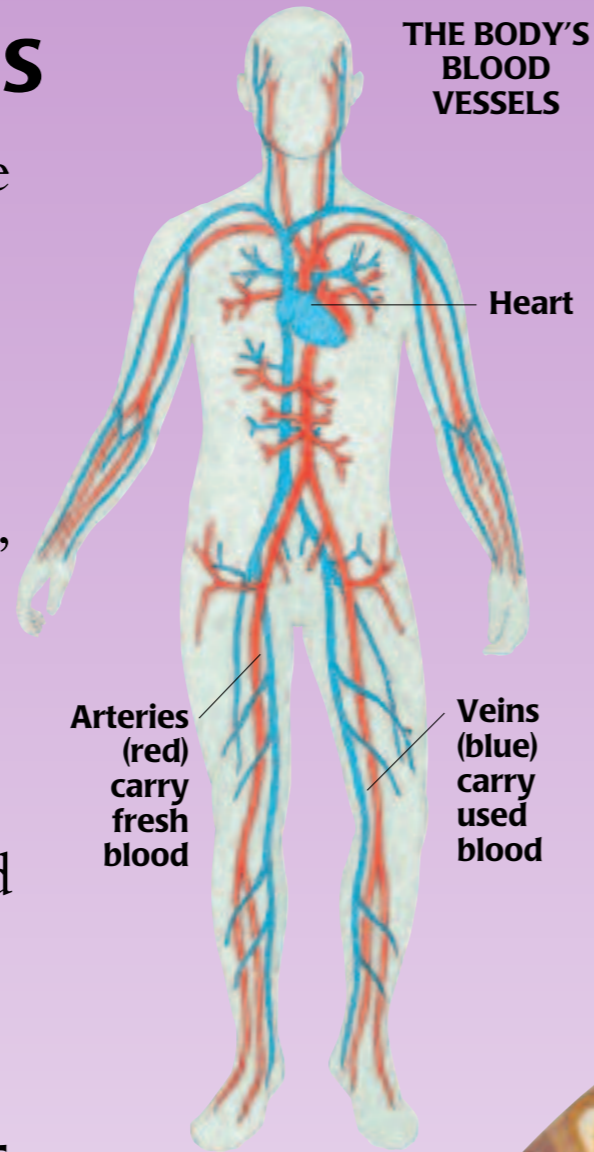


SEEING

Light shines into your eye through the dome-shaped front, called the cornea. It then passes through a hole, the pupil, in a coloured ring called the iris (the iris is the part that gives your eye its colour). The light is focused by the pea-sized lens. It passes through the middle of the eyeball on to a very thin curved sheet, the retina. This turns the pattern of light into nerve signals for the brain.

HEART AND LUNGS

YOUR heart and lungs are in your chest. Your lungs breathe in air, and take from it the gas oxygen. This is needed by every tiny cell in your body, to use energy and stay alive. The oxygen passes into the blood in your lungs. Your heart pumps blood through the blood vessels all around your body.

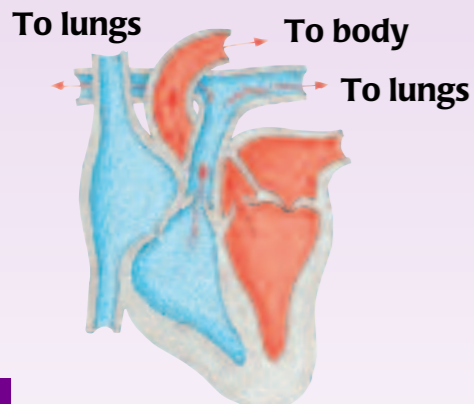


From body



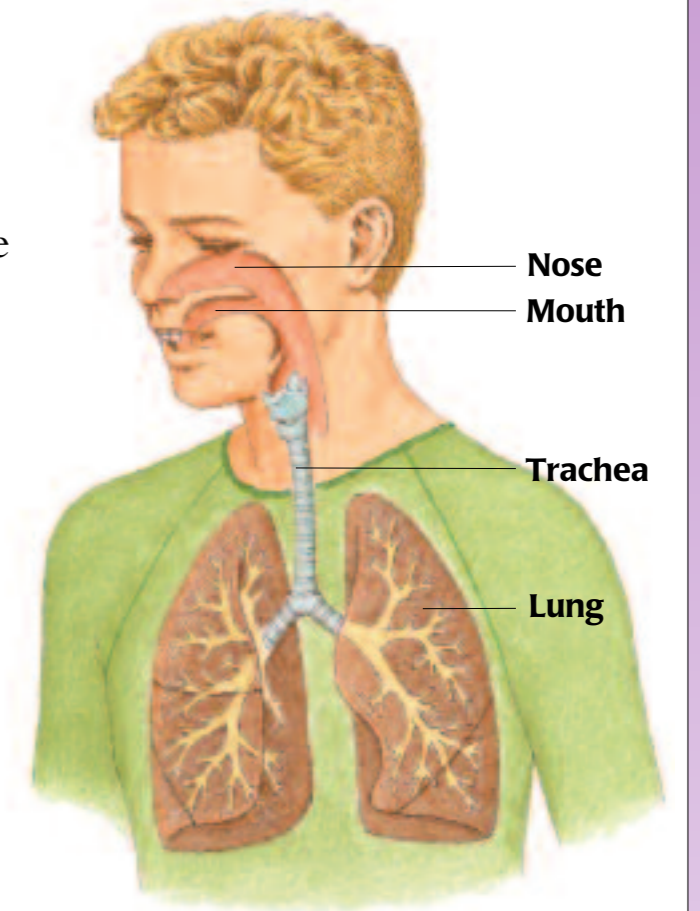
A HEARTBEAT

First your heart relaxes (*upper picture*). Used blood (blue) flows from your body into the heart's right side. Fresh blood with plenty of oxygen (red) comes from the lungs into your heart's left side. Then the heart squeezes powerfully (*lower picture*). Used blood goes to your lungs, and fresh blood flows out to all body parts.

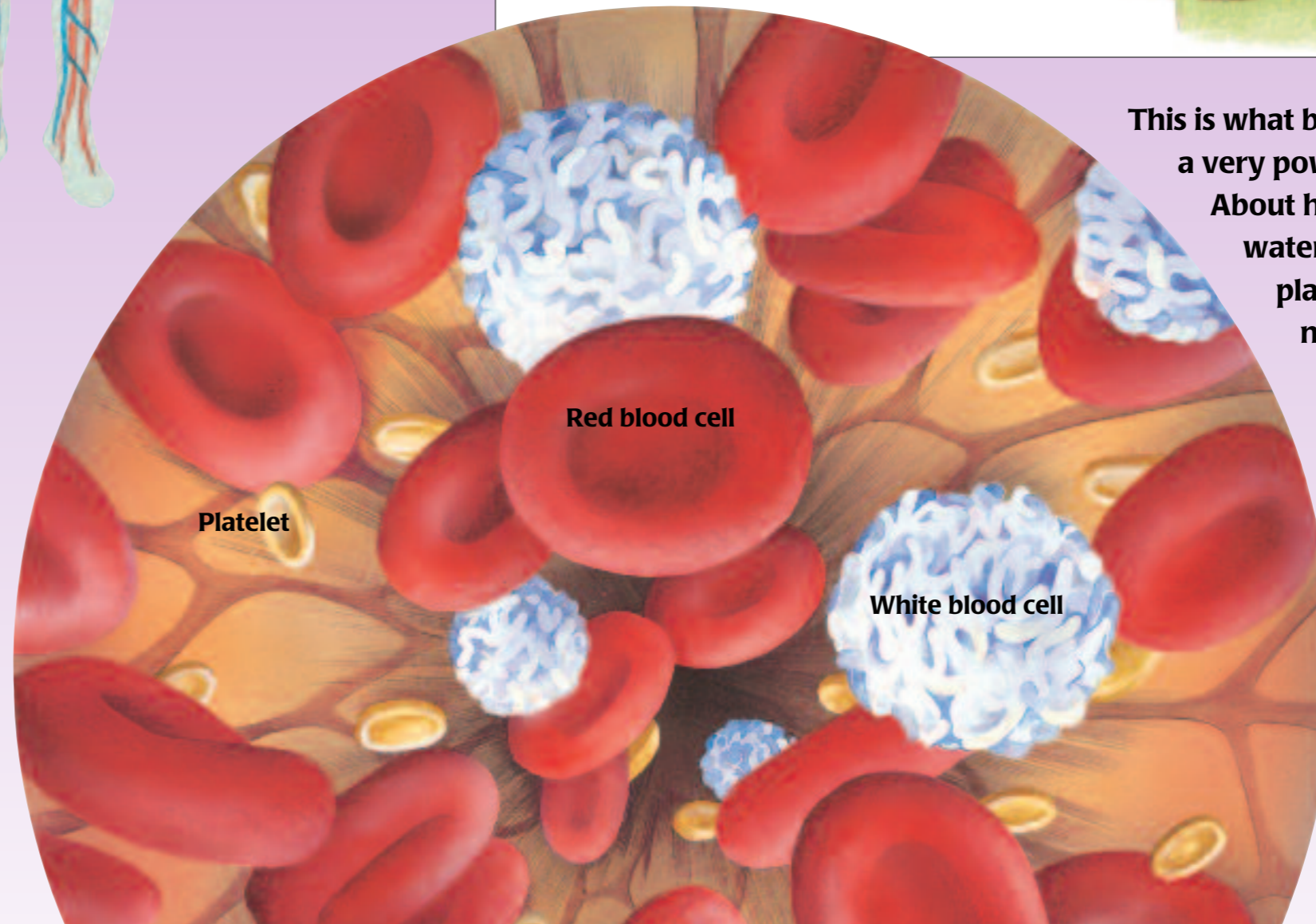


BREATHING

With each breath, your lungs suck in air through your nose and mouth, and down your trachea. The air goes along branching air tubes deep into your lungs. Here carbon dioxide passes from your blood to your lungs and oxygen passes from air into your blood. The used blood (dark red-blue) becomes fresh blood (bright red). You then breathe out the carbon dioxide.

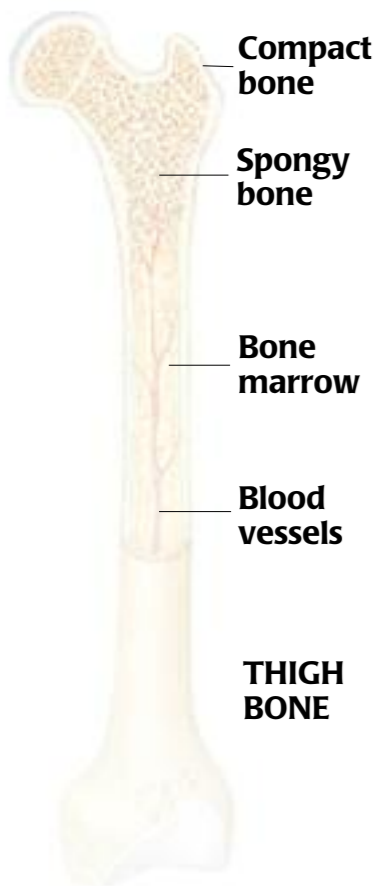
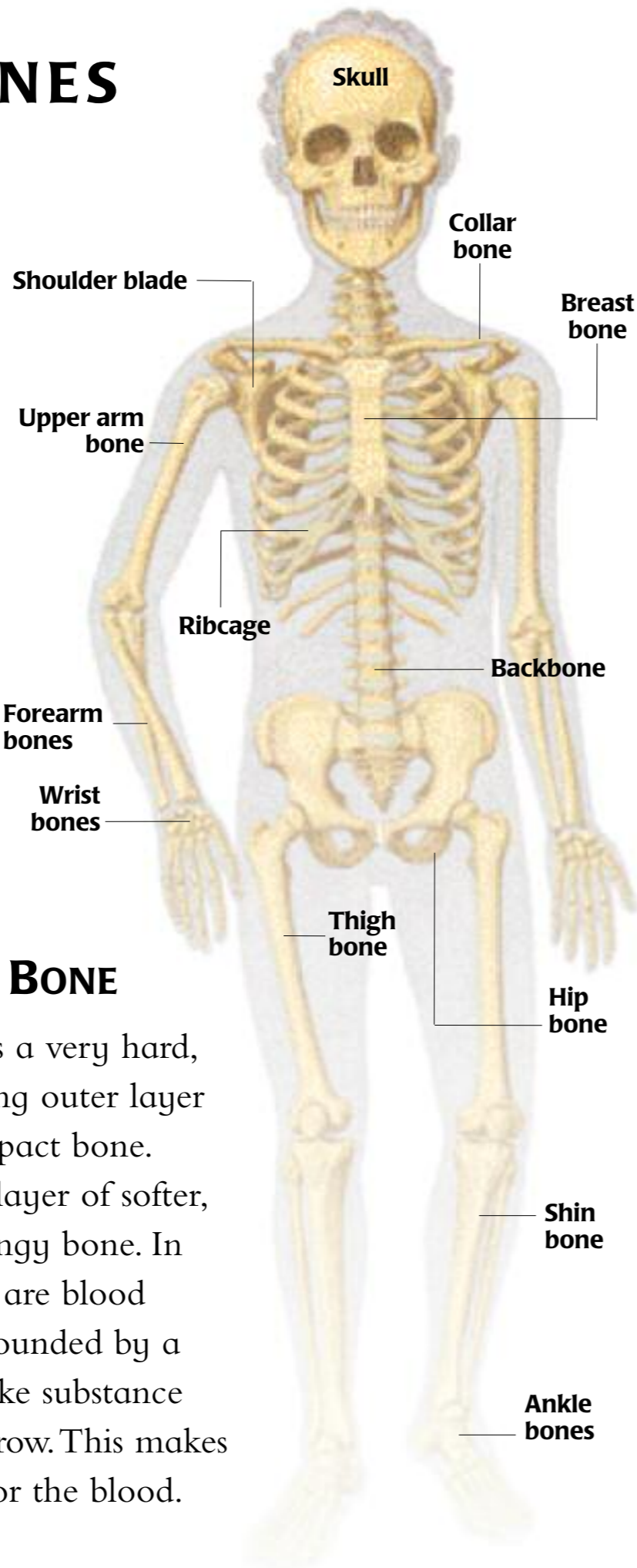


This is what blood looks like under a very powerful microscope. About half of your blood is a watery liquid called plasma. It contains nutrients. Most of the rest is made up of billions of red blood cells. Shaped like doughnuts, they carry oxygen around the body. White blood cells kill any germs. Platelets help blood to clot and seal a cut.



MUSCLES, BONES AND SKIN

YOUR 206 bones form a strong inner framework that holds up your body. Muscles pull your bones so that you can move. Tough, stretchy skin covers almost all of your body parts.

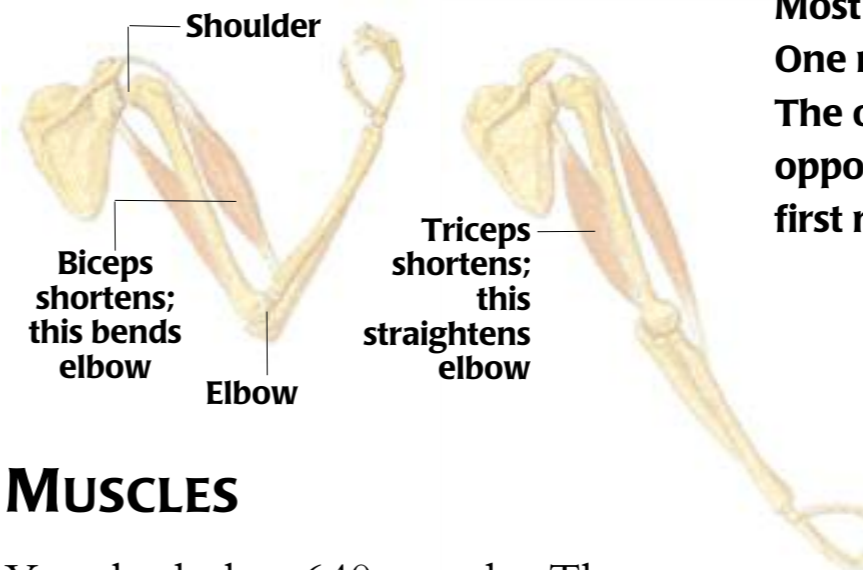
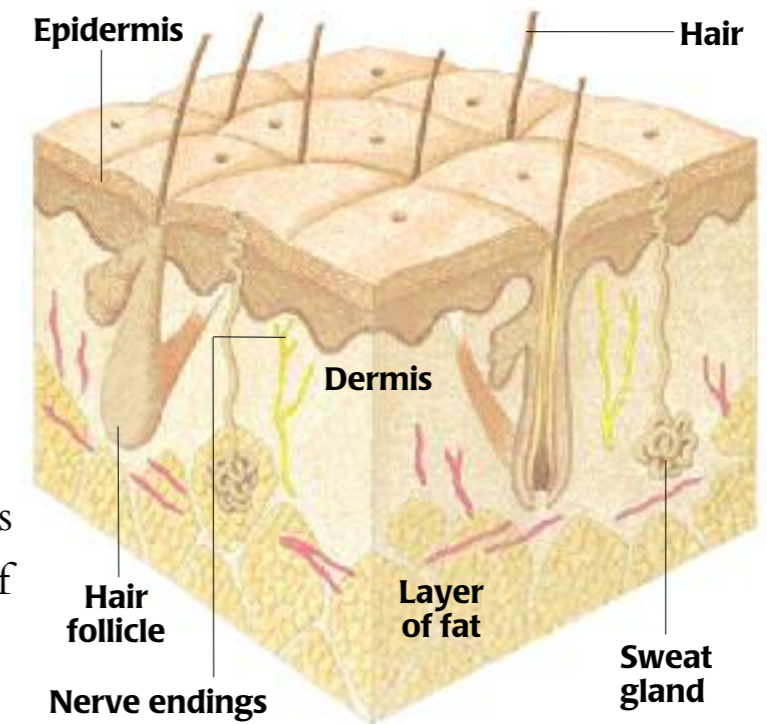


INSIDE A BONE

A bone has a very hard, heavy, strong outer layer called compact bone. Inside is a layer of softer, lighter, spongy bone. In the middle are blood vessels surrounded by a soft, jelly-like substance called marrow. This makes new cells for the blood.

SKIN

Your outer layer of skin is called the epidermis. It is always growing to replace itself as it is rubbed and worn away. The inner layer is called the dermis. This has tiny pits called hair follicles, where hairs grow. There are also millions of microscopic sweat glands and nerve endings for touch.



Most muscles are in pairs or groups. One muscle pulls its bone one way. The other pulls the bone the opposite way. As this happens, the first muscle relaxes and is stretched.

MUSCLES

Your body has 640 muscles. They form over one-third of your whole body weight. Strong, rope-like parts called tendons connect the muscles to bones. A special type of muscle called smooth muscle forces food along your oesophagus, stomach and intestines. Your heart is made of another special muscle that beats constantly and never gets tired.



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