

Chapter - 1 Plants and animals on earth

Question

What's the coldest place where animals live?

How deep is the sea and are there animals and plants down there?

Where is the highest mountain on earth? Do you get plants and animals that live up there?

Do you get living things in a desert?

What are vertebrates and invertebrates?

Can you imagine how difficult it must be to live on rocks being pounded by waves all day and all night long? Which animals in this picture live on or near the rocks?

Carefully study all the animals in the pictures and find things that some animals have in common. Classify the animals into groups based on these similarities.

Many eco-tourists like to visit our country and see the natural sights and attractions. Some tourists like to go on tours where they enter into a cage which is lowered into the water.

The tour operators often chuck small pieces of meat into the water to attract sharks which then swim around the cage. This is called shark cage diving. Do you think shark cage diving is appropriate?

Bees are not the only animals that can pollinate flowering plants. What animals do you think can pollinate a tree's flowers?

Why can't the honey guide bird just eat some of the larvae without waiting for the honey badger?

How does the honey badger break open the hive?

Why does the honey badger not get stung by the bees?

Explain in your own words how this is an example of interdependence between three animals.

CONTENT

You might have heard that people say our planet Earth is the blue Planet. When astronauts in space look down on Earth, the water that covers more than two thirds of the planet makes it look as if the planet is blue. Thousands of plants and animals can live on Earth because there is water.

The many plants and animals that live on Earth choose special places to live. The place where a plant or animal lives is called its habitat.

There is a special word we use when talking about all the animals

and plants and their different habitat. We call it 'biodiversity' When you look at the biodiversity of a certain area you look at all the different kinds of habitats in that area including all the animals and plants in that area.

Many different plants and animals

The earth is home to the most amazing diversity of animals and plants. Each animal and plant naturally chooses where it wants to live: its habitat.

aquatic habitats

Thousands of different animals and plants live in or near water in aquatic habitats. There are two main kinds of aquatic habitats - marine (saltwater) habitats and freshwater habitats. The plants and animals that live in these habitats are adapted to either live in salt water or in fresh water.

In South Africa there are examples of both types of aquatic habitats.

Our country has a very long coastline with many different types of habitats. For example, many animals live in and around the rock pools. They have to withstand the harsh sun and the constant pounding of the waves.

Many animals live in or near freshwater ponds, dams and lakes, rivers and streams. These include small insects, snails, clams, crabs, frogs and fish. Larger animals like turtles, snakes, ducks and large fish, as well as hippos and crocodiles also live in or near water.

Some water plants have roots, for example water lilies and reeds.

Water plants make oxygen for the animals to breathe and provide

food for many of the animals to eat.

Water lilies floating on the water.

In South Africa we also have large wetlands where rivers slow down and the water stands still or flows very slowly. Wetlands provide food and shelter and a natural habitat for an incredible amount of animals: frogs, reptiles, birds (like ducks and waders) and fish, to name a few!

Deserts and semi-desert habitat

Deserts are areas that have a very low rainfall each year - in some deserts it only rains once every 5 years!

The Namibian desert.

The desert may look dry, but there are many different plants and animals which are suited to living in these areas. Plants that can survive without much water in the desert include grasses, acacias, aloes, cacti and other succulents. Succulents are plants that can store their water in their leaves and stems and survive well in dry climates.

Many animals live in the desert (for example, the Kalahari), including:

- Predators (eg. lions, cheetahs and leopards, hyenas, jackals)
- Large and small mammals (eg. meerkats, giraffes, warthogs, porcupines)
- antelope (eg. eland, gemsbok, springbok and hartebeest, steenbok, kudu, duiker)
- Many species of birds (eg. falcons, ravens, eagles, buzzards, hawks, turtle doves). The social weavers are small weaver

birds that build family nests where hundreds of weaver families can live!

- Many different reptiles (eg. puffadders, cobras, lizards, geckos iguanas)
- a great many insects also live in the desert, such as bees and butterflies, grasshoppers and many more!

Grassland habitat

Grasslands are covered in grasses with very few trees. as soon as the first rains fall the grasses grow incredibly fast and new plants sprout all over the bare earth. This is also the time when many animal babies are born as the new grass can feed the mothers to provide plenty of milk for the young.

Forest habitat

a forest is a large area that is mostly covered in trees. eorests are extremely important to life on earth. The many trees clean the air and provide oxygen for the animals on earth to breathe. They also provide people with fuel, food and shelter, medicine and employment (through all the industries that are built around forestry). Many animals live in forests, from large elephants and bears to smaller monkeys, squirrels, owls and woodpeckers.

We need to conserve (look after) our forests and stop people who want to chop down naturally growing trees. ht is very important to also conserve the many animals that help pollinate trees and spread their seeds over large areas. Without these animals the trees would not be able to reproduce and would become extinct.

Interdependence in an ecosystem

Plants and animals, humans, rivers, mountains - everything is connected in one way or another. all living and non-living things depend on each other.

We can group interdependence into two main groups:

. The interdependence in an ecosystem between living things (how animals and plants are interdependent).

. The interdependence in an ecosystem between living and non-living things.

Interdependence between living things

Many plants and animals depend on each other for different things.

) interdependence and feeding

animals depend on plants and other animals for food. animals can be divided into the following groups, according to what they eat:

- herbivores eat plants.
- carnivores eat the animals that eat the plants.
- Omnivores eat plants and animals.
- Scavengers feed off plants and dead animals.
- Decomposers are animals that assist the natural process of decomposition. They eat and break down the remains of dead animals. The elements that are released during this process (carbon, phosphorus and nitrogen) are put back in the soil and become food for plants.

) interdependence and pollination

Plants depend on animals for pollination.

animals that pollinate flowers are called pollinators. Plants use different methods to attract pollinators. This includes producing nectar, special smells or having brightly coloured flowers. Some

plants even make their flowers look like female wasps to attract male wasps!

bees about to collect nectar and, at the same time, pollinate the flowers.

honey. Without bees, most flowers cannot be fertilised. If flowers are not fertilised, they cannot produce seeds and will not be able to reproduce.

a world without pollinators would not be very sweet. Look at the following things we eat and drink that all depend on pollinators.

) Interdependence and seed dispersal

Plants need to have their seeds spread over a wide area. If all the seeds fall in one spot, the plants that grow will not have enough water, soil or sunlight to grow properly! That is why plants make their fruit sweet and tasty. In this way they attract animals who will eat the fruit, walk a long way off and excrete the seeds. Where the seeds fall they will then have a rich, fertile soil (from the animal excretion) to grow in! Other seeds stick to an animal's fur - they might not even know it's there! When they brush against a tree for example, the seed will just fall off. Plants depend on animals for seed dispersal.

interdependence between living and non-living things

Living things are also depend on non-living things in an ecosystem.

Living things depend on their environment for:

- air (oxygen and carbon dioxide)
- Water
- Soil
- food
- Shelter and a place to safely have their young.

- Places to hide from danger.

Water and oxygen are extremely important for all living things.

Water that we drink from a tap or from a river, is all part of a very big system called the Water cycle. The Water cycle is a very good example of how all living things are interdependent.

Trees and other plants depend on the water in the soil. Other animals and plants depend on the water that runs down from the mountains in rivers and streams and collects in lakes. Plants and animals in the sea depend on this water as it forms the environment that they live in.

animal types

Now we know more about the different habitats on earth and in South Africa. We also know that animals and plants depend on each other and on their habitat. Let's look at the different types of animals that live on planet earth.

Introducing this topic

This unit explores the different kinds of animals grouped into two main groups: vertebrates and invertebrates. CAPS refer to animals with bones and those without bones. The vertebrate groups are: mammals, birds, reptiles, frogs (amphibians) and fish. The invertebrate group are those without bones such as worms,

millipedes, insects, spiders, scorpions and crabs.

Grouping animals

When we group similar things together, it is called classifying.

When classifying animals, there are generally two main groups of animals - those who have bones inside their bodies with a backbone, and those who do not have bones inside their bodies.

- animals with a backbone are classified as vertebrates.
- animals without a backbone are classified as invertebrate.

When people realised that they could group the animals into two main groups, they went even further and started grouping them into smaller groups within the two main groups. Look at this next illustration which shows some of these groups.

classification of animals

Invertebrates

Invertebrates are animals that do not develop a backbone (spinal column). They also do not have an endoskeleton (a bony skeleton inside their bodies). They do develop a different types of skeletons, like hydroskeletons and exoskeletons.

These soft-bodied animals mostly have what we call a hydroskeleton. dxamples of animals with a hydroskeleton are:

- sea anemones
- earthworms
- jellyfish
- some starfish and sea urchins

animals with such a body often need to live in or near water or damp soil. Their skins are often thin and moist because they breathe through their skin.

Many invertebrates have a shell or hard covering protecting their bodies. This external skeleton is called an exoskeleton.

Vertebrates

Vertebrates are animals that have a skeleton inside their bodies (an endoskeleton). Part of their skeleton is a backbone. The word 'vertebrate' is closely related to the word 'vertebrae' which is what we call the individual bones that form the backbone (so vertebrates have a backbone made up of vertebrae). Vertebrates are broken down into smaller groups:

- fish
- amphibians (including frogs)
- Reptiles
- birds
- Mammals

Key Concept

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- There are many different plants and animals.
- They live in different habitats on earth.
- all the plants and animals and their habitats make up the total biodiversity of the earth.
- South africa has a rich variety of indigenous plants and animals and their habitats.

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CHAPTER-2 ANIMAL SKELETONS

Question

- What does my skeleton look like?
- Why do h have bones in my body?
- Do all skeletons look like mine?
- can you tell if a skeleton belongs to an animal or a human?

*compare the bones in the backbone of the giraffe below with that of the human above. What do you notice about the shape of the vertebrae in the neck and in the back of the giraffe and those of the human's neck and bones?

*Do you remember what a skeleton's function is? List as many of the functions of the skeleton as you can think of below.

*List four other joints in your skeleton.

* How do the bones and the joints move?

. What type of skeleton do you have?

ndoskeleton

. What do all vertebrate animals have that makes them vertebrates?

. What is a major difference between the skeletons of a mouse,

a crab and an earthworm?

CONTENT

Skeletons of vertebrates

Every time a vertebrate animal moves, it uses its bones, joints and muscles. In this section we are going to study the bones, joints and muscles that help vertebrates to move.

Bones

Bones are hard and form a very strong frame structure to support and protect a vertebrate animal's body.

Vertebrates all have similar kinds of bones - some are much bigger than others, but the basic structure of the bones are very similar.

Different kinds of bones.

. Now see if you can identify these bones in some other vertebrate skeletons! Use this key to show on the picture of the skeleton where the different bones are :

- L = Long bone
- S = Short bone
- e = flat bone
- h = irregular bone

Functions of the bones in a vertebrate skeleton:

. The skull

The vertebrate skull is made up of different bones that grow together to form a protective "box" or "shell" structure.

- The skull protects the eyes and ears, nose and mouth.
- The brain is protected by the brain.

- The teeth and the lower jaw is also attached to the skull.

. The backbone

- The backbone is made up of vertebrae.
- a hole runs through the middle of each vertebrae. When the vertebrae are connected, the holes all line up to form a tube.

This is where you find the spinal cord. The spinal cord is a bundle of nerves that is connected to the brain. It is surrounded by blood vessels.

- The backbone has two functions (jobs):
 - it protects the spinal cord that runs inside it.
 - it supports the upper body.

3. The ribs

Vertebrates have long curved bones around their chest. We call these bones ribs. These ribs are joined to the backbone and often to the front to form the rib cage.

- in most vertebrates, the ribcage is around the chest area of the animal to protect the lungs, heart and other important organs.
- in animals like snakes, the ribcage can protect and support the whole body.
- The breast bone in birds is much longer. The flight muscles attach to this.

Many mammals have a similar shape rib cage. compare the rib cages of these animals to your own.

4. Shoulder blades, arms, legs and hip bones

Vertebrates use their fore and hind limbs for movement.

Many animals' limbs are attached to their bodies at the shoulder or hip joints. However not all animals have hip or shoulder girdles - like fish and snakes.

- Muscles attach to the shoulder blades and they control the movement of the forelimb or arm.
- The lower or back limbs (legs) attach to the body at the hips.

2.2 Movement in Vertebrates

Now that you know a little more about bones, let's see how animals use their bones, joints and muscles to help them move.

Joints

Joints are the places where bones come together. They come together in a special way to allow the animal or human to move - like at your elbow or wrist. There are different kinds of joints.

Key Concept

- a vertebrate skeleton (inside the body) has bones and joints.
- bones are strong and form a strong frame structure.
- a skeleton protects part of the body.
- a skeleton supports the body.
- Vertebrate animals can move because they have muscles

attached to the skeleton.

- a mouse has a skeleton and backbone inside their bodies.

This is called an endoskeleton.

- a crab has no bones inside its body but a hard shell outside its body to protect it. This is called an endoskeleton.

- an earthworm has no bones inside its body nor does it have a casing on the outside like the crab. It has a hydroskeleton which is fluid support.

. below is a diagram of the human skeleton. Label the following on the diagram of the skeleton:

- skull
- backbone
- ribs
- rib cage
- shoulder blade
- hip bone
- upper limb
- lower limb
- Think of at least two other bones in the skeleton that we did not include in this list. Label them on the skeleton.

. joints help us to move. Look at the diagram of the human body. add in labels to show where you can find an example of the following:

- elbow joint
- knee joint
- shoulder joint

. Name the three things that all vertebrates need to be able to

move.

bones, joints and muscles; if they say tendons and ligaments that is technically correct too so give them a point for each one (this should earn them bonus points)

. What is the difference between the way a human moves, the way a dolphin moves and the way a dog moves? Describe the movement of each animal, the limbs that are used and the position of the body.

a human walks upright on the hind limbs whereas a dog walks on all four limbs. a dolphin uses its front limbs and its tail to move through the water. a human and a dog move on the ground whereas a dolphin moves in the water. humans and dogs have four limbs, but a dolphin only has two limbs and a tail for movement.

CHAPTER 3- Skeletons as structures

Question

- How does a skeleton or shell keep things safe inside?
- Do humans have shell or frame structures?
- How do you make a structure really strong?

*.Which organs does the rib cage protect?

*When you press on the shapes as in the picture, which shape is the most stable and rigid? explain how you could make the other shape stronger and more stable.

CONTENT

Structures

a structure is something that is arranged or put together in a specific way and is made up of different parts. a jungle gym is an example of a structure. It has many different parts like beams, ropes, and bars, that are put together in a special way.

a jungle gym is a type of structure. ,

Most structures are designed to remain stable and rigid which means they should not break and crumble or topple and fall over if

something heavy is placed on top of or against them.

Structures have different jobs or functions. They:

- support
- protect
- enclose - that means they keep something in or they keep things from getting in (like a tin of juice or a fence around a building).
- help with movement

We get three kinds of structures:

- frame structures
- shell structures
- solid structures

In all structures, the shape of the structure is very important. a structure will be able to resist or hold a certain weight depending on its shape.

In fr. in Matter and Materials, we looked at strong frame structures and also how to make structures stronger using struts and braces. In this chapter in Life and Living, we are going to focus

on two kinds of structures: frame structures and shell structures.

This is because they relate to the skeletons of animals.

Frame structures

Frame structures are easy to identify because they have a frame or a skeleton. These structures are built or put together by attaching pieces of material together to make a frame. Look at these photos of frame structures.

One of the most important frame structures for all vertebrate animals is their skeleton. The material used to make this frame is bone that is attached to the muscles that move the skeleton. The skeleton supports the muscles and protects the organs.

In general, we can say that all vertebrates have a frame structure as a skeleton. This is because vertebrates have an endoskeleton which supports makes a frame to support the body.

Shell structures

Shell structures generally hold or protect things inside the structure. humans make shell structures to protect and hold things, like a dish, a tin, a car or house.

In nature, eggshells and the exoskeletons of invertebrates, like crab and crayfish shells, are examples of shell structures. Shell structures are made to resist a very heavy load.

Strengthening Structures

Structures that protect something or hold a weight without breaking or falling, need to be really strong. Let's investigate the

different ways we can use to strengthen a structure.