Science

Quarter 1 Study Guide

Topic 3 Matter and Energy in Ecosystems

Topic 6 Fossil Evidence

READING MATERIAL

Read About Food Webs

FOOD WEB DEFINITION

To understand how plants and animals interact, scientists make diagrams called food chains. A *food chain* shows a sequence of living things in which one organism eats the one below it. Most animals eat more than one thing, so to show ALL the feeding relationships, we use *food webs* which are made of many intersecting food chains.

To better understand the food web definition....

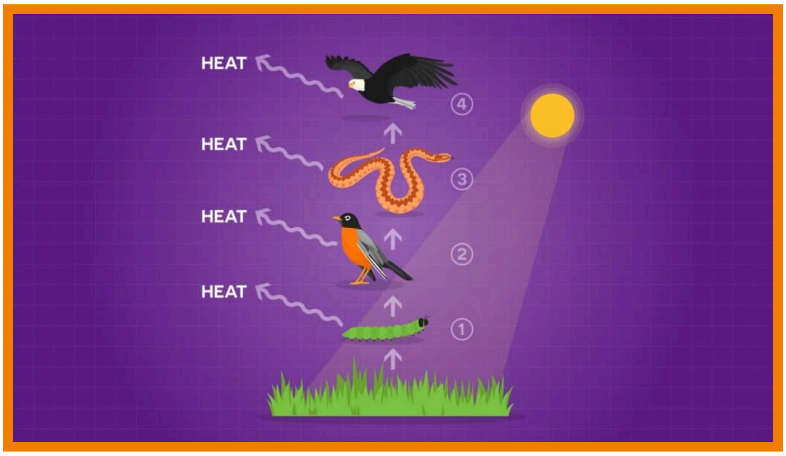
LET'S BREAK IT DOWN!

Energy in food can be traced back to the sun.

Living things need a constant supply of energy. The sun provides that energy, which is transformed into food by plants through photosynthesis.

Herbivores (plant-eating animals) eat the plants and receive energy. When the herbivore is eaten by a carnivore (an animal that eats herbivores), the energy from the herbivore is transferred to the carnivore. The transfer of energy from one organism to another makes up a *food chain*.

Animals eat to get energy and building blocks.

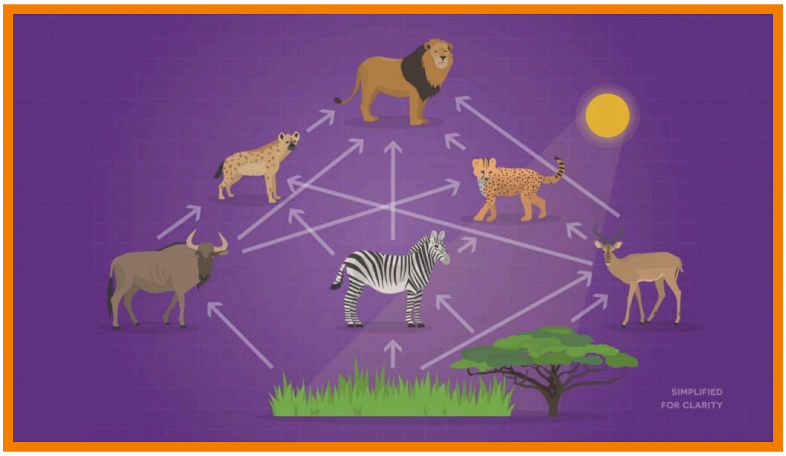


All living things need food to provide materials for growth. Food chains start with organisms that make their own food, called *producers*. Plants are the most common producers. Animals are called *consumers* because they do not make their own food -- they eat, or consume, other organisms.

A food chain typically only has a few steps (usually 4 at the most). This is because each time one organism eats another, some of that energy is used up and released as heat.

In fact, you are releasing heat energy right now as you read this because your body is burning food to keep warm! Since some energy gets used up in each step of the food chain, there can only be a few steps, otherwise there is not enough energy left for the organism at the top.

A food web is a model of intersecting food chains.



Most organisms can eat, and be eaten, by many different animals. A food chain wouldn't be able to show this. Food webs show all these connections. They are more complicated but more accurate.

In the African savannah food web shown here, we can see multiple arrows pointing to different animals. The arrows show the direction the energy is transferred. For example, we can see that zebras eat trees and grasses, so arrows from trees and grasses are pointing to a zebra.

The arrows pointing from the zebra to cheetahs, hyenas, and lions tell us that the zebra is eaten by these animals.

The lions are at the top of the food web, which means they are not eaten by any other type of animal (except by decomposers when it dies). We call this *an apex predator.*

Decomposers break down dead organisms.

One group of consumers that are often not shown in food webs are *decomposers*. Decomposers are organisms **(mostly bacteria and fungi)** that break down dead plants and animals, eventually turning them into nutrients that will be added to the soil.

These nutrients are very important to continue the cycle in the ecosystem. Slugs, earthworms, millipedes, and centipedes also help break down dead things. Without decomposers, nutrients would not get recycled and we would have dead material piled up everywhere.

FOOD WEB EXAMPLES

The great horned owl is an apex predator. They eat mice, rats, frogs, snakes, and rabbits. That keeps the prey populations from getting too high and overgrazing the ecosystem.

Overhunting can make an ecosystem out of balance. If wolf populations are reduced, the population of deer would increase dramatically. This causes areas to be overgrazed, meaning there is not enough grass for other animals. Everything needs to be in balance.

Common soil creatures, such as earthworms, are decomposers. They recycle nutrients in the ecosystem through decomposition.

FOOD CHAIN AND FOOD WEB VOCABULARY

Food Chain	A sequence of living things in which each one feeds on the living thing below it.
Food Web	A food web is a model made of intersecting food chains.
Photosynthesis	A process by which plants use sunlight to make sugar from carbon dioxide and water.
Producer	A living thing (almost always a plant) that takes energy from the sun and make its own food. They are found in the first level of a food web.
Apex Predator	An animal found at the top of a food web and is not eaten by any other animals. Examples include sharks, owls and lions.
Decomposer	Living things that break down dead and decaying organisms. The most common decomposers are bacteria and fungi.

DISCUSSION QUESTIONS ON FOOD CHAINS AND FOOD WEBS

Why do animals eat other animals?

Animals eat other animals to obtain energy and building blocks (nutrients) in order to grow and repair.

What are producers and consumers and how do they get their names?

Plants are producers because they produce their own food through photosynthesis. Animals are consumers because they consume plants or other animals.

What role in the food web does the eagle play?

An eagle is an apex predator, meaning it is at the top of the food web. Nothing else will attack and eat an eagle. Eagles will eat things like birds, snakes, mice and other animals.

What is an apex predator and why are they critical for the health of the ecosystem?

An apex predator is an animal that feeds on other animals but is at the top of the food web, meaning that it has no predators. Apex predators help control the balance of an ecosystem by keeping the populations of other animals in check.

What do zebras eat and what eats zebras?

Zebras eat grass and they are eaten by predators like hyenas and lions.

What is the role of worms, bacteria and fungi in a food web?

These living things are decomposers. They recycle matter, by breaking down dead and decaying matter. They turn it into nutrients in the soil, which plants use. If ecosystems didn't have decomposers, dead plants and animals would just pile up.

READING MATERIAL

Read About Fossils and Extinction

FOSSIL DEFINITION

Fossils are the remains or traces of plants and animals that lived a long time ago. Fossils help scientists understand what life was like millions of years ago. Some fossils provide evidence of living things that have gone *extinct*, which means they are no longer found alive anywhere on earth today.

To learn more about fossils and extinction...

LET'S BREAK IT DOWN!

A fossil is the remains or traces of prehistoric life.

Fossils are the preserved remains of an animal, such as the animal's bones, or impressions of the animal's activities, such as footprints. Even poop can be considered a fossil.

It's important to remember that plants can be fossils too!

Fossils can be found all over the world, however, there are areas that have a lot more fossils than other areas.

An extinct animal is one that is no longer found on Earth today.

When an entire type of animal dies out, they are extinct. Extinct animals are gone forever.

Fossils help us understand why an animal went extinct. Some extinctions were caused by sudden changes in an organism's habitat such as floods, wildfires, or other natural events. Hunting, habitat loss, and pollution are common reasons why organisms go extinct today.

Fossils provide evidence about past life and their environment.

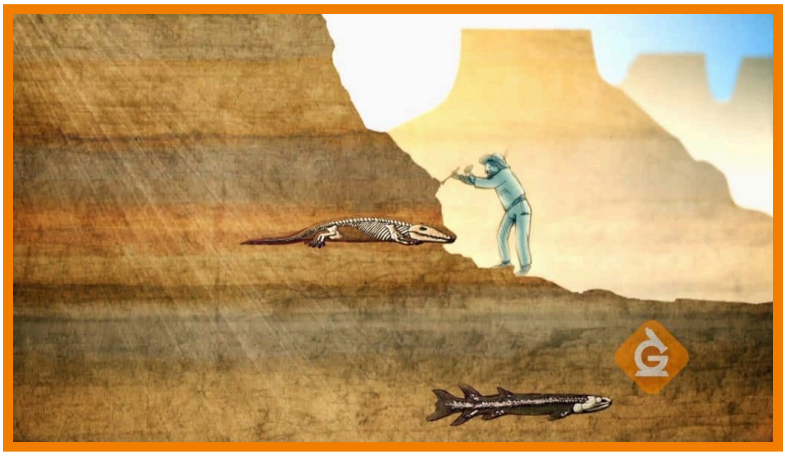
Scientists can learn a lot about the history of life from fossils, such as what types of animals live in a particular location.

We know that the area that is now Mt. Everest was once at the bottom of the sea because scientists found fossils of ocean animals there.

By looking at the teeth of extinct animals, scientists are able to determine their diet. When fossils with long pointed teeth are found, scientists know that the animal was a carnivore (animals that eat meat). If a fossil with flat, smooth teeth is found, the animal is likely a herbivore (animals that eat plants).

Also, the size and shape of the skull are used to determine the size of an animal. Scientists can even use dinosaur footprints to determine how fast the dinosaur ran, how many legs it had, and if it traveled alone or in groups.

How did plants and animals become fossils?



Fossils can be made from the actual remains of an organism (like bones, teeth, shells or leaves), or they can be preserved records of a living thing's activity (like footprints or animal droppings). Only a small number of organisms have become fossilized.

When living things die, they typically don't leave anything behind. If an animal was quickly buried after it died, the bones or shells may have been left behind. Over time, the sediment over the dead organism hardens into rock. Fossils are revealed when something like erosion brings their remains to the surface and they are discovered.

FOSSIL EXAMPLES

Many fossils have been discovered at the La Brea Tar Pits in Los Angeles, California. Ancient animals got stuck and were preserved as fossils in asphalt pits, thousands of years ago.

Most dinosaur fossils have been found in North America, China and Argentina. So many fossils have been found in the United States that each state has its own designated fossil.

Paleontologists and dentists use the same types of tools. These small tools help paleontologists carefully remove debris around tiny fossils without breaking them.

FOSSILS AND EXTINCTION VOCABULARY

Fossil	Remains or traces of plants and animals that lived a long time ago.
Extinct	A living thing that is no longer found alive anywhere on earth today.
Saber-Toothed Cat	A huge cat with two long, saber-shaped teeth that it used for hunting. It went extinct about 11,000 years ago and fossils of it are found in places like the La Brea Tar Pits.
La Brea Tar Pits	A fossil dig site located in the middle of Los Angeles. They have found over 1 million fossils there. About 50,000 years ago, many animals were trapped here in a sticky black substance that oozes from cracks in the earth's surface (asphalt). Animals got stuck and were preserved as fossils.
Paleontologist	A scientist that studies fossils.
Dire Wolf	A type of wolf that lived in North America, but went extinct about 10,000 years ago. Its teeth are larger than wolves of today and it ate horses, ground sloths, mastodons,

bison, and camels!

FOSSILS AND EXTINCTION DISCUSSION QUESTIONS

Why are so many fossils found in the La Brea Tar Pits fossil dig site?

Many animals became trapped in a thick, sticky liquid called asphalt that seeped through cracks at the Earth's surface. They got stuck and died and their bones were preserved.

What tools are used to remove fossils from the rock?

Dental picks are used to carefully scrape away small amounts of rock from the fossil. Other tools include brushes to sweep away dirt and a chisel and hammer, which is used to chip away at harder surfaces.

What happens to the fossils after they are removed from the tar pit?

When fossils are dug out of the ground, they still have rock or asphalt around them. The fossils are taken to a lab to be further cleaned before they are categorized and studied.

What does a Fossil Preparator do?

Fossil Preparators receive fossils that come from the dig site and clean them! At the La Brea Tar Pits, asphalt can be dissolved from the fossils using a special liquid. For types of rock other than asphalt, Fossil Preparators must clean fossils using additional tools.

What are some of the types of animals that are found at the La Brea Tar Pits?

Animal fossils found at the La Brea Tar Pits include horses, saber-toothed cats, short-faced bears, mammoths, giant sloths and dire wolves. In total they have found over 1 million fossils.

Explain how we know that one of the skulls is a carnivore and the other is a herbivore.

Zoe notices that the teeth from one of the skulls are flat and the teeth from the other one are sharp. She knows that animals that exist today that have flat teeth (like cows or horses) eat grass and that animals with sharp teeth, like cats, eat meat.