Ecosystems

Objectives

- **Identify** how biotic and abiotic factors of the environment are interrelated.

- **Describe** the five levels of environmental organization.

- **Describe** how the availability of an abiotic factor can affect a biotic factor.

Ecology

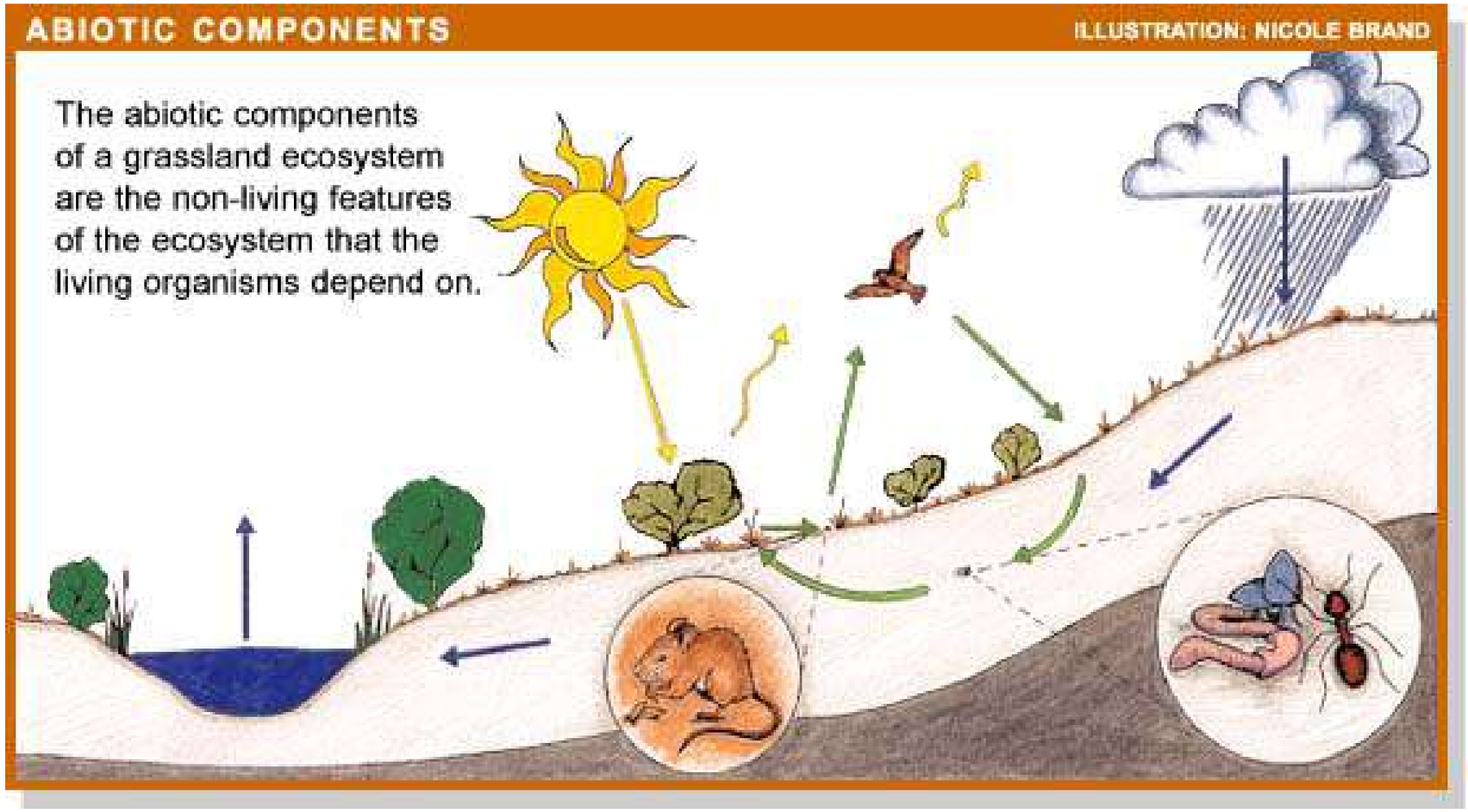
- **Ecology** is the study of the INTERACTIONS of organisms with one another and with their ENVIRONMENT

Environment

Divided into 2 Parts

- **Biotic**: **living parts of the environment**
  - **Plants, Animals**
  - **Anything Living**
- **Abiotic**: **non-living parts of an environment**
  - **Soil, Water, Light, Temperature**
  - **Never was alive or is now dead.**

Abiotic Components



5 Levels of Environmental Organization

Organism

- **A living thing.**
- **Lowest Level of Organization**
- **Any thing that can carry out life processes independently.**
  - **An alligator**
  - **You**
  - **A Gopher tortoise**

Population

- **A group of organisms of the same species that live together at the same time in the same place.**

✶ **Alligators**

✶ **Your neighbors**

✶ **Gopher tortoises**

Communities

- **All the populations of species that live and interact in an area.**
  - ✶ **Alligators, fish, birds .**
  - ✶ **Your neighborhood**
- **Depend on each other for survival**
  - ✶ **Alligators eat fish, birds use grass to make nests**
- **The type of community is determined by the biotic and abiotic factors available (sunlight, soil, water, climate, plant types and more)**

Ecosystems

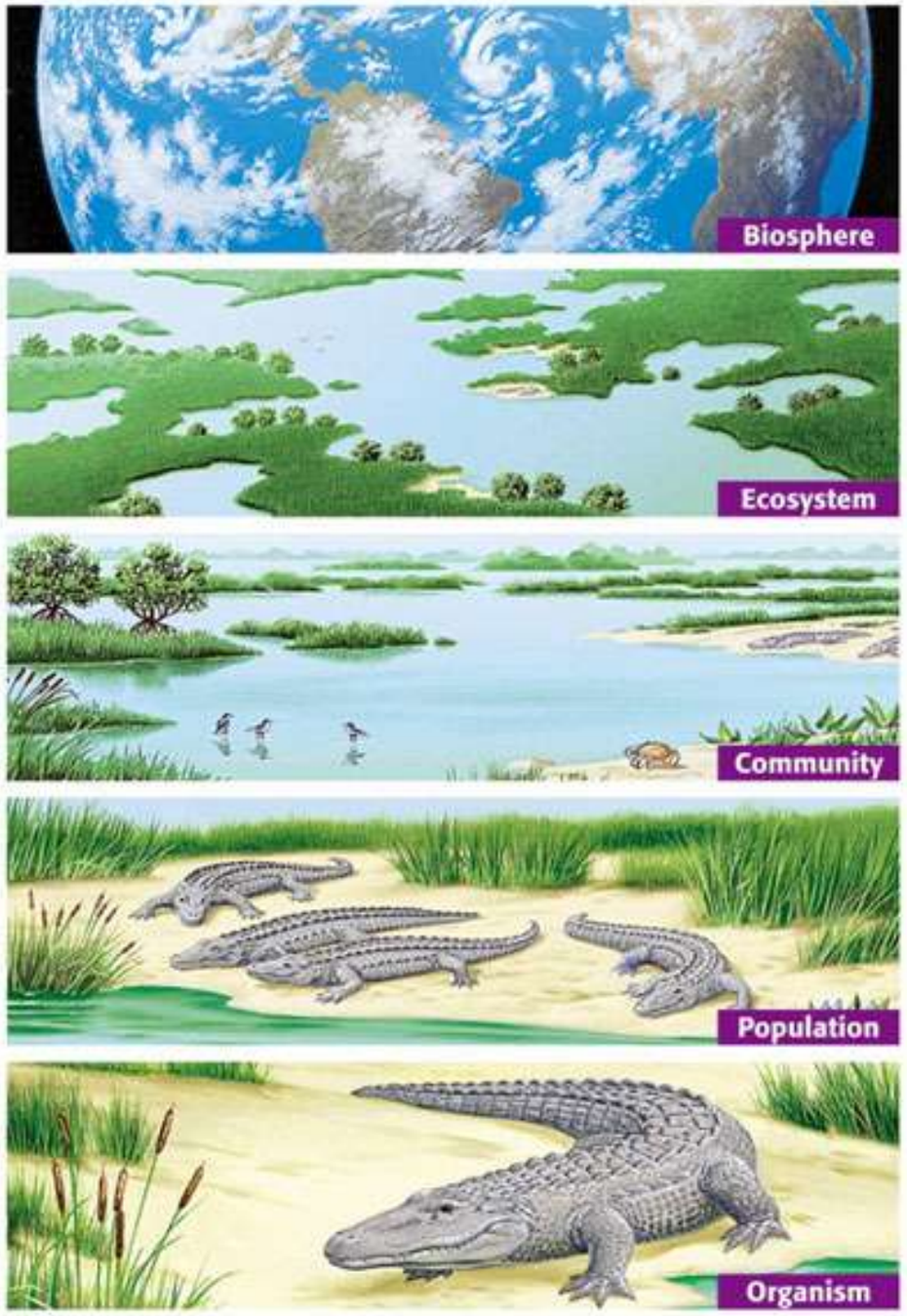
- **Made up of a community of the biotic (living) and abiotic (non-living) factors of the communities interacting with each other.**
  - **Wetland (Everglades), Coral Reef**

Biosphere

- **The most complex level.**
  - **The part of Earth where life exists.**
  - **Extends from the deepest part of the ocean to high in the air where plant spores drift.**

Section 1

The Five Levels of Environmental Organization



Species

Organisms that are closely related and can reproduce

Habitat

A place where an organism usually lives

Niche

An organisms role in an ecosystem

Limiting Factor

A resource that is so scarce that it limits the size of a population.

Limiting factors PREVENT a population from growing.

some examples are:
not enough FOOD not enough SPACE and poor LIVING conditions.

Carrying Capacity:

The largest population that an environment can support.

Example

- **Water, Rabbits,Food**

F F

W W W

SSSS

- **Limiting Factor**

FOOD and WATER

- **Carrying Capacity**

2 SNAKES

Example

- **Water, Snakes,Food**

F F F

W W W W

R R R R

- **Limiting Factor**

FOOD

- **Carrying Capacity**

3 RABBITS

Interactions Between Organisms

- **Individuals and Populations Interact**

- Populations contain individuals of a single **species** that interact with one another, such as a group of rabbits feeding in the same area.
- Communities contain interacting **populations**, such as a coral reef with many species of corals living in the same area.

What's the difference?

Endangered

Any species that is in danger of extinction throughout all or a significant portion of it’s range

At the brink of extinction now

What's the difference?

Threatened

Any species which is likely to become endangered within the foreseeable future

Likely to be at the brink of extinction in the near future

What's the difference?

Invasive

Any species that is **not native** to an ecosystem.

Ecologists

- An *ecologist* is one who looks at how all the BIOTIC and ABIOTIC factors in an ecosystem are RELATED.

- Ecologists study the Biosphere to learn how organisms interact with the abiotic parts of the environment

The Energy Connection

- An organisms energy role in an ecosystem may be that of a
  - Producer
  - Consumer
  - Decomposer

The Energy Connection

- **Producers**

Organisms that use sunlight directly to make food. (*photosynthesis*)

- They make food by using a process called **PHOTOSYNTHESIS** which is when plants use the sun's **energy** to turn **CO2** and **WATER** into molecules of **OXYGEN** and **GLUCOSE**. (Glucose is a type of sugar that is the plant's **FOOD**

The Energy Connection

- **Consumers**

Organisms that eat other organisms

Types of Consumers

- **Herbivore** Eats plants

- **Carnivore** Eats other animals

- **Scavenger** Carnivores that feed on dead organisms

- **Omnivore** Eat both plants and animals

The Energy Connection

- **Decomposers**

Organisms that get energy by breaking down dead organisms.

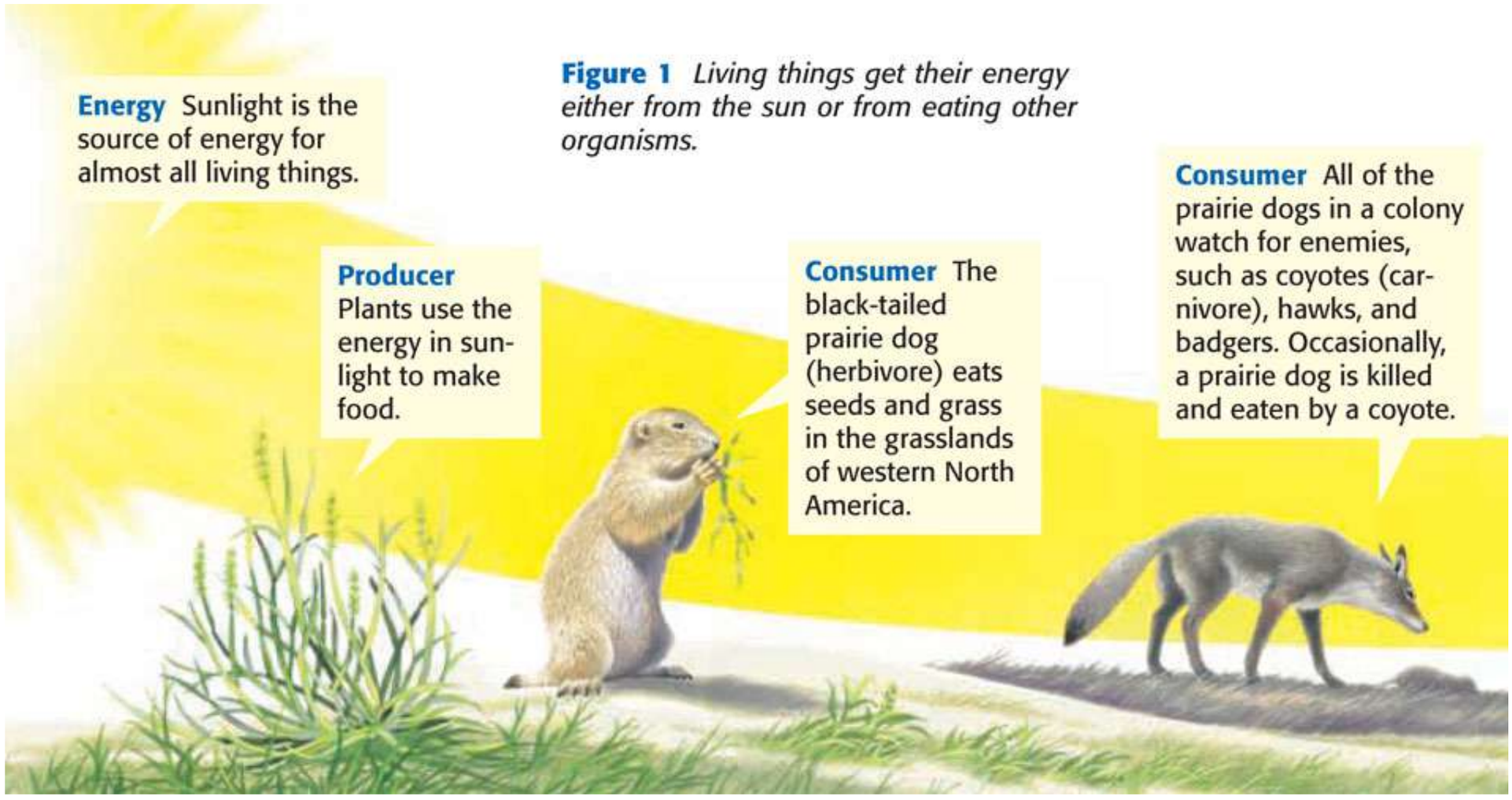


Figure 1 *Living things get their energy either from the sun or from eating other organisms.*

End Of Slide

Consumer A turkey vulture (scavenger) may eat some of the coyote's leftovers. A scavenger can pick bones completely clean.

Decomposer Any prairie dog remains not eaten by the coyote or the turkey vulture are broken down by bacteria (decomposer) and fungi that live in the soil.

End Of Slide

BrainPop

- http://highered.mcgraw-hill.com/sites/0078617839/student_view0/brainpop_movies.html#

Concept Map

LEVELS OF ENVIRONMENTAL ORGANIZATION

HIGHEST

LOWEST

ENERGY ROLES

PRODUCERS

WHICH USE SUNLIGHT TO TURN

INTO

CARNIVORES

Concept Map

LEVELS OF ENVIRONMENTAL ORGANIZATION

HIGHEST
BIOSPHERE

ECOSYSTEM

COMMUNITY

POPULATION

LOWEST
ORGANISM

ENERGY ROLES

PRODUCERS
Make their own food

WHICH USE SUNLIGHT TO TURN

WATER (H2O)

CARBON DIOXIDE (CO2)

INTO

FOOD (GLUCOSE)

OXYGEN (O2)

DECOMPOSERS
Break down dead organisms, returning nutrients to the soil.

CONSUMERS
Eat other organisms

OMNIVORES
Eat animals & plants

HERBIVORES
Eat plants

CARNIVORES
Eat animals

SCAVENGERS
Eat dead animals

Food Chain

A diagram that shows how energy in food flows from one organism to another.

It demonstrates this by showing which organism eats which.

Food Web

A diagram that shows the feeding relationships between organisms in an ecosystem.

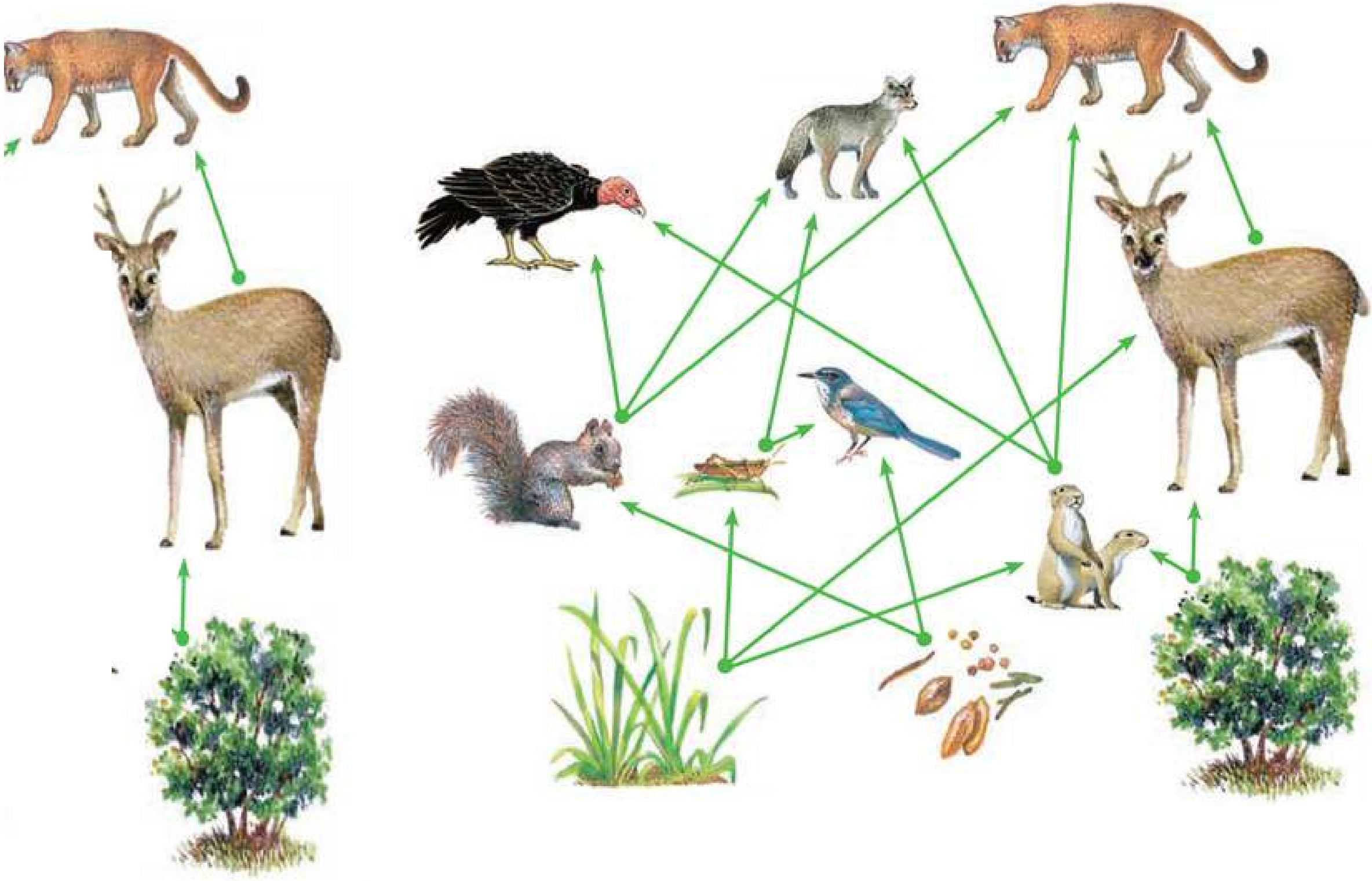
It consists of many overlapping food chains in an ecosystem.

Food Chain

Just 1 path of energy

Food Web

Everything is connected



Energy Pyramid

A triangular diagram that shows an ecosystem's loss of energy, which results as energy passes through the ecosystem's food chain.

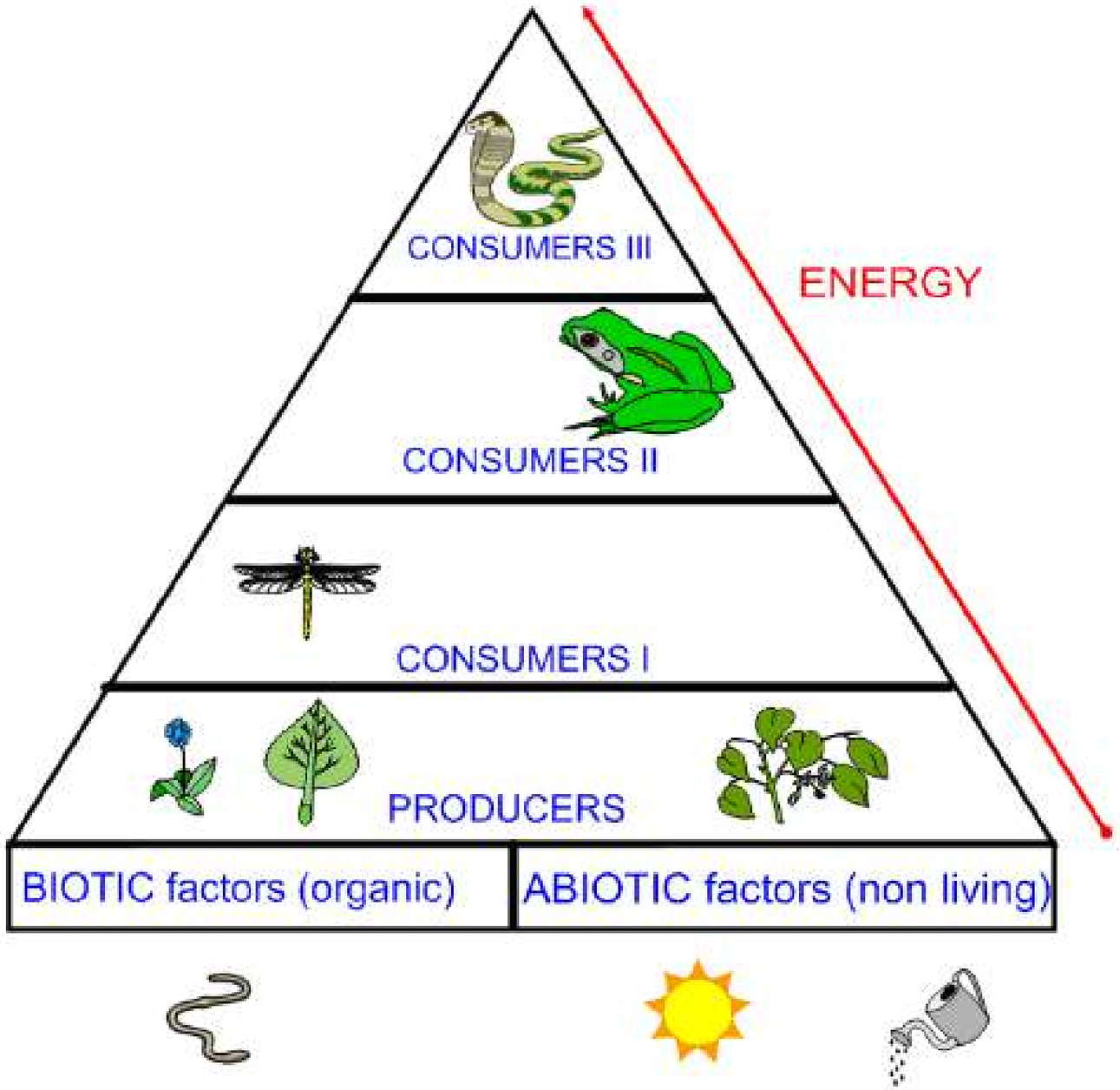
It shows the amount of energy that moves from 1 feeding level to the next.

Energy Pyramid

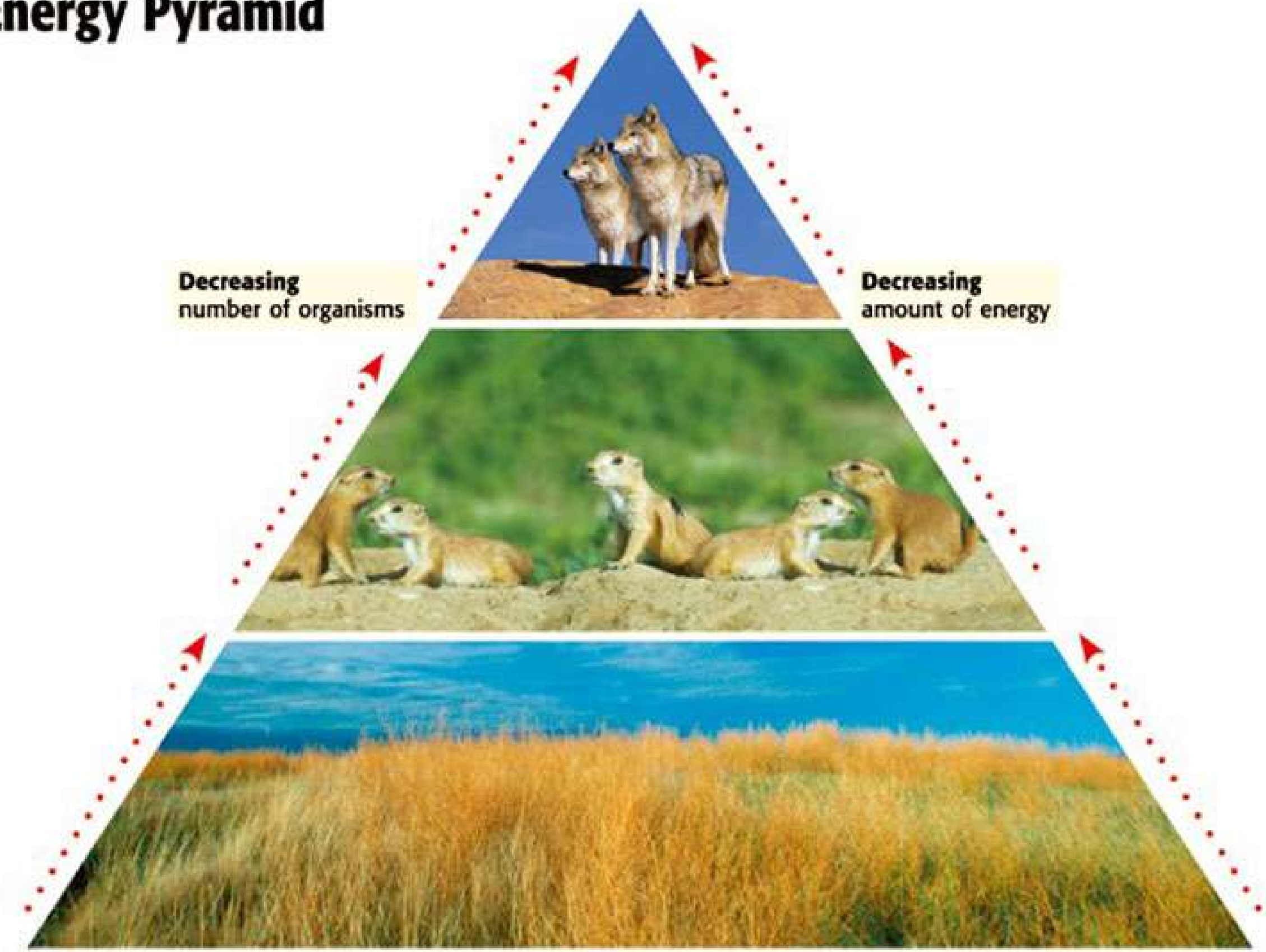
The most energy is available at the producer level.

Only about 10% of the energy at one level of a food web is transferred to the next, higher level

- How energy in food flows from 1 organism to another.



Energy Pyramid



The pyramid represents energy. As you can see, more energy is available at the base of the pyramid than at its top.

Balance in Ecosystems

All organisms in a food web are important for the health and balance of all other organisms in the food web.

Objectives

- Explain the relationship between carrying capacity and limiting factors.

- Describe four ways that organisms interact with each other.

- Distinguish between mutualism, commensalism, and parasitism.

- Give an example of coevolution.

Interactions Between Organisms

- Individuals and Populations Interact

Ecologists have described **four main ways in which organisms affect each other.**

Predation

Symbiosis

Competition

Coevolution

Predators

organisms that kill and eat all or part of another organism.

Prey

Organisms that are killed and eaten by other organisms.

Interactions Between Organisms

Predator Adaptations: To survive, predators must be able to CATCH their PREY.

Predators have a wide variety of methods and abilities for doing so.

Prey Adaptations: Prey also have many methods and abilities to AVOID being eaten.

Interactions Between Organisms

RUN away
stay in a GROUP
CAMOUFLAGE themselves, they do this by
BLENDING in with the background

Some can defend themselves with CHEMICALS.
The skunk and the bombardier beetle both spray predators with irritating chemicals.

Bees, ants, and wasps inject a powerful acid into their attackers.

being POISONOUS or VENOMOUS .

Symbiosis

a relationship in which two different organisms live in close association with each other.

Symbiotic Relationships

Mutualism

a symbiotic relationship between two species in which both organisms benefit.

Commensalism

a symbiotic relationship in which one organism benefits and the other is unaffected

Symbiotic Associations

Parasitism

- A symbiotic association in which one organism benefits while the other is harmed.
- The organism that benefits is called the *parasite*,
- The organism that is harmed is called the *host*.

Competition

When two or more individuals or populations try to use the same resource, such as food, water, shelter, space, or sunlight,

- Competition can happen *within* a population, or *between* populations.

Coevolution

- When a long-term change takes place in two species because of their close interactions with one another.

- **Coevolution and Flowers**
- Flowers have changed over millions of years to attract pollinators.
- Pollinators such as bees, bats, and hummingbirds can be attracted to a flower because of its color, odor, or nectar.

Chapter 12

Standardized Test Preparation

1. When living things die, they are recycled by other organisms in nature. Maggots that feed on the remains of dead organisms are a part of this recycling process. Maggots break down dead organisms so that bacteria and fungi can convert the matter into simpler materials, such as water and carbon dioxide. Other organisms can then use these materials. During this cycle, a maggot would be classified as which of the following?

A. a host

B. a predator

C. a herbivore

D. a decomposer

Chapter 12

Standardized Test Preparation

1. When living things die, they are recycled by other organisms in nature. Maggots that feed on the remains of dead organisms are a part of this recycling process. Maggots break down dead organisms so that bacteria and fungi can convert the matter into simpler materials, such as water and carbon dioxide. Other organisms can then use these materials. During this cycle, a maggot would be classified as which of the following?

A. a host

B. a predator

C. a herbivore

D. a decomposer

2. Jonquila finds an interesting lizard near a pond. Its tail is colored bright yellow and red. What type of defense against predators does this lizard most likely have?

F. camouflage

G. chemical

H. grouping

I. remoras

2. Jonquila finds an interesting lizard near a pond. Its tail is colored bright yellow and red. What type of defense against predators does this lizard most likely have?

F. camouflage

G. chemical

H. grouping

I. remoras

3. The characteristics of a praying mantis make it easy for it to be camouflaged by the green stems of plants. While camouflaged, a praying mantis can feed on other insects that inhabit or feed on a plant. If a praying mantis feeds on natural enemies of a plant, what type of relationship is occurring between the praying mantis and the plant?

A. camouflage

B. competition

C. mutualism

D. parasitism

3. The characteristics of a praying mantis make it easy for it to be camouflaged by the green stems of plants. While camouflaged, a praying mantis can feed on other insects that inhabit or feed on a plant. If a praying mantis feeds on natural enemies of a plant, what type of relationship is occurring between the praying mantis and the plant?

A. camouflage

B. competition

C. mutualism

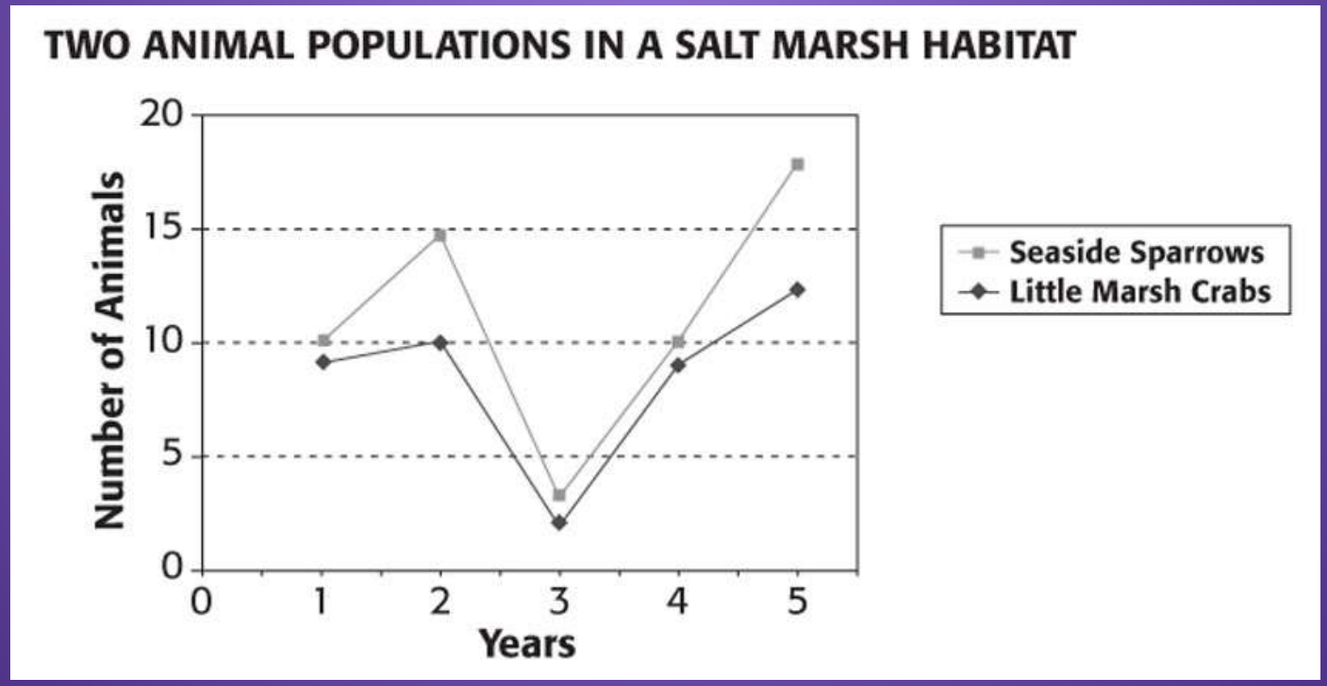
D. parasitism

4. The upper level of the ocean receives enough sunlight for algae to grow. Lower levels of the ocean receive little if any sunlight. Some parts of the ocean floor can be completely dark. The animals that live on the ocean floor get their food from dead organisms that float down from above. Where would you expect to find the greatest amount of stored energy in the ocean? Where would you find the least amount of stored energy? Explain where you would expect to find producers and consumers.

4. The upper level of the ocean receives enough sunlight for algae to grow. Lower levels of the ocean receive little if any sunlight. Some parts of the ocean floor can be completely dark. The animals that live on the ocean floor get their food from dead organisms that float down from above. Where would you expect to find the greatest amount of stored energy in the ocean? Where would you find the least amount of stored energy? Explain where you would expect to find producers and consumers.

The upper level of the ocean will have the greatest amount of stored energy. This is where most producers are found. The bottom level of the ocean will have the least amount of stored energy. This is where the consumers, such as carnivores, scavengers, and decomposers exist. Producers that rely on chemicals, rather than light, can live on the ocean floor.

5. The diagram below shows the number of seaside sparrows and number of little marsh crabs in a small salt marsh habitat over a five year period. During this time period, there was a disease that killed off most of the cordgrass in the marsh.



Continued on the next slide

End Of Slide

Question 5, *continued*

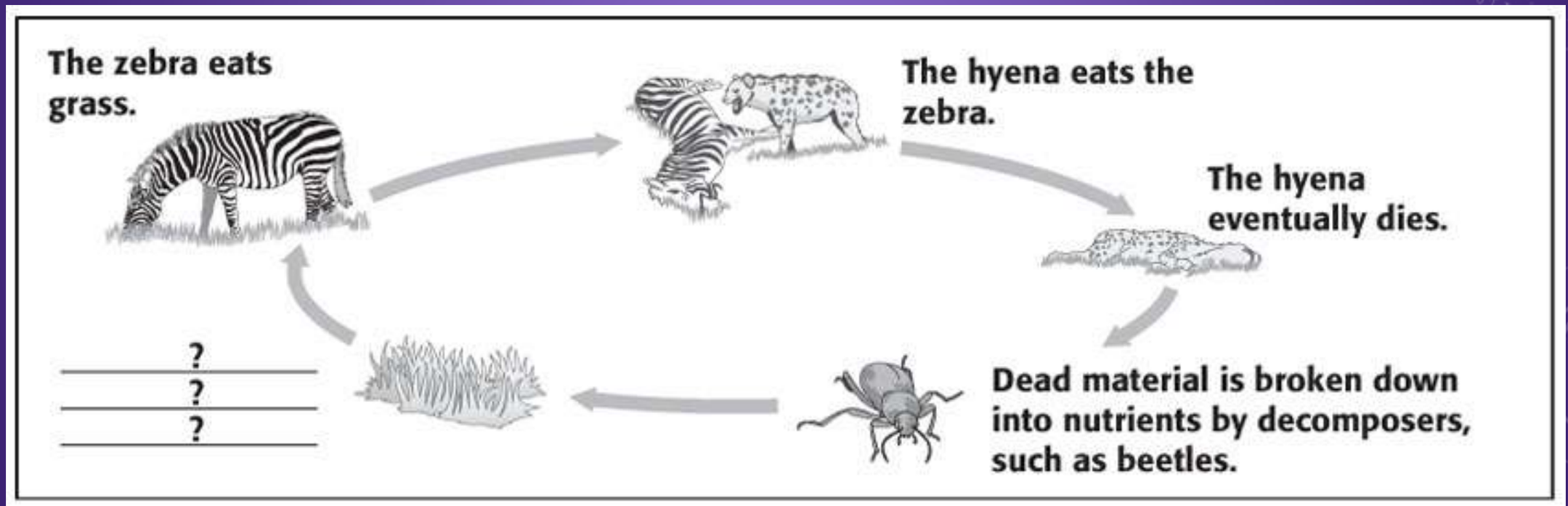
5. How many little marsh crabs were alive during the year that the disease occurred?

Question 5, *continued*

5. How many little marsh crabs were alive during the year that the disease occurred?

The disease occurred in the third year, and two little marsh crabs were alive during that year.

6. The diagram below shows a typical food chain in a grassland ecosystem. Notice that there is a missing entry in the food chain.



Continued on the next slide

End Of Slide

Question 6, *continued*

6. What description should go next to the drawing of grass to complete the food chain?

F. The zebra eats grass.

G. Scavengers, such as vultures, eat grass.

H. Grass is decomposed by sunlight and water.

I. Grass grows by absorbing nutrients from the soil.

Question 6, *continued*

6. What description should go next to the drawing of grass to complete the food chain?

F. The zebra eats grass.

G. Scavengers, such as vultures, eat grass.

H. Grass is decomposed by sunlight and water.

I. Grass grows by absorbing nutrients from the soil.